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ABSTRACT

Designed to coordinate teacher-developed materials in computer literacy, this resource unit is composed of several sections. The first, "Planning for Computer Instruction," provides an outline for developing a school-level computer task force, management procedures for computer labs, and sample student survey forms. The remaining sections provide sample activities for classroom use within the major topics of "Getting Started," "LOGO," "Word Processing," and "BASIC." Each sample activity includes suggestions and guidelines for teachers on: (1) appropriate grade levels; (2) performance expectations; (3) curriculum areas; (4) prerequisites; (5) materials, including hardware, software, and supporting peripherals; (6) classroom management; (7) teacher preparation; (8) pre-computer activities; (9) hands-on activities; and (10) follow-up enrichment activities. The materials reflect the teacher-developer's own environment; variables include size of school, characteristics of student population, accessibility to microcomputers, and teaching style. Supporting materials include a computer literacy software list with notations of grade level, price, and publisher; recommended periodicals for teachers; computer books for students; teacher references; and local resources on computer education. Also included is a table showing the sizes of microcomputer keyboards and reference charts. (JB)

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# EXPLORATORY COMPUTER LITERACY CURRICULUM GUIDE, GRADES K-6

## RESOURCE UNIT

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## FOREWORD

The Foreword to the Exploratory Computer Literacy Curriculum Guide, Grades K-6, made a special note of the dynamic nature of computer technology and computer education. This resource unit was designed to provide teachers with more recent developments in computer literacy and to share resources developed by teachers in the field. It replaces the resource section, pages 131 to 141, of the Guide.

We hope that all elementary school teachers and principals will find this resource useful for initiating and implementing computer literacy programs in their classrooms and schools.

Francis M. Hatanaka
Superintendent

## ACKNOWLEDGMENT

The Resource Unit addendum to the Exploratory Computer Literacy Curriculum Guide, Grades K-6 reflects the coordinated efforts of five teachers who developed the guidelines for school planning and the sample activities. They are:

| | |
|---|---|
| Violet Hara | Kapalama Elementary |
| Jean Izu | Maunawili Elementary |
| Dorcas Okuna | Kaneohe Elementary |
| Virginia Sakoda | Kamiloiki Elementary |
| Doreen Yamashiro | Windward District Office |

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# INTRODUCTION

As schools develop plans and programs to meet the challenge of providing computer experiences for their students, teachers and principals have requested the sharing of implementation strategies and available resources. This resource unit is an initial effort towards coordinating teacher-developed materials in computer literacy.

The materials reflect the teacher-developer's own environment. Variables include size of school, characteristics of student population, accessibility to microcomputers and teaching style. The guidelines for school planning as well as the sample activities are intended to serve as models for what can be done. Teachers and principals using these materials will need to modify the examples to accommodate their own classroom or school situation.

The first section, Planning for Computer Instruction, provides an outline for developing a school-level computer task force, management procedures for computer labs, and sample survey forms.

The remaining sections provide sample activities for classroom use. The major topics are:

Getting Started
Logo
Word Processing
BASIC

For each topic sample activities are provided. Each sample activity includes suggestions and guidelines for teachers in the following categories:

Grades
Performance Expectations
Curriculum Areas
Prerequisites
Materials
Classroom Management
Teacher Preparation
Pre-Computer Activities
Hands-On Activities
Follow-Up/Enrichment Activities

The suggestions and guidelines describe one way to conduct the activity. Depending on differences in the availability of microcomputers, where they are located in the school, class size, teaching styles and student background, the activity will have to be modified. Each sample activity is intended to serve as a suggestion based on the experiences of the teacher-developer, <u>not</u> as a prescription or formula for all to follow.

One assumption made in the development of this resource unit was that teachers using it have received training in the use of computers in education. Minimum training equivalent to Phase II of the Department of Education's inservice training model was assumed. Ideally, teachers would have completed all four phases of inservice training identified in the model.

# PLANNING FOR COMPUTER INSTRUCTION

## ESTABLISHING COMPUTER TASK FORCE OR COMMITTEE

Whenever a new curriculum area is to be instituted at the school level, a task force or committee is usually formed to be responsible for planning, implementation and evaluation of the new program. Such an organization will facilitate implementation of the Exploratory Computer Literacy Curriculum Guide, Grades K-6.

Membership - The committee should be a workable group of 6 to 8 members and include interested teachers representing primary (K-3) and upper grade levels (4-6), school librarian, parents and the principal. The district resource teacher in charge of this area of the curriculum can be invited to attend the meeting whenever feasible.

Functions - Responsibilities of the task force or committee's responsibilities may include:

1. Establish goals and objectives for school's Exploratory Computer Literacy program based on state and district goals and objectives subject to faculty approval. (See Developing School Plan pp. 5-8.)

2. Provide and explain student survey and assessment (pre-post) instruments to be used by teachers.

3. Conduct and compile results of surveys of students faculty and parents regarding computers.

4. Work out a Master Schedule for implementation of planned instruction (3-5 years).

5 Plan for and possibly conduct workshops, training sessions, sharing sessions, meetings for:

   a. use of computers
   b. use of computer guide
   c. demonstrations of instruction
   d. setting up rules for computer activities
   e. monitoring of computer lab (parents)
   f. sharing of instructional ideas and strategies

6. Set up the computer lab

   a. decide on location
   b. arrange furniture and equipment
   c. take inventory of furniture, equipment, software
   d. set up bulletin board displays
   e. set up scheduling procedures and post schedule
   f. establish rules for housekeeping, handling and care of equipment, security measures and student conduct in the laboratory

7. Develop budget plans for purchase of hardware, software, teaching materials.

   a. project needs over 3-5 year period
   b. seek sources of funding (lobby with faculty when necessary)
   c. prepare annual orders (by quarters)
   d. discuss fund raising possibilities

8. Make a resource list of parents, firms and other community people who can assist in the computer program as: speakers, consultants, teachers, etc.

9. Act as liaison, clearinghouse, screening committee and mediating board on any matters regarding school's computer program.

10. Communicate all important decisions, efforts and requests for outside input to faculty and parents whenever and wherever feasible and necessary.

11. Plan any sharing activities such as a Computer Fair, Children's Sharing Night, Teacher's Computer Ideas, etc.

12. Evaluate committee or task force's functions and achievements at the end of the year.

Frequency of Meetings

At the onset of organizing the group the meetings may be frequent and long. But once the basic structure and responsibilities are set the meetings may be held once a month or as needed.

## DEVELOPING SCHOOL PLAN

I. Assessment

A. Students: Assess and survey students' computer knowledge and experiences. (See sample Student Surveys pp. 9-13.)

B. Faculty: Survey background knowledge, training and experience in computers. (See sample Faculty Survey on Computer Education p. 14.)

C. Parents: Survey parents' knowledge and experience in use of computers and also their willingness to assist school's computer program as resource people, monitoring of computer laboratory and instructing other parents. (See sample Computer Survey for Parents p. 15.)

D. Materials and Equipment (Software and Hardware): Check inventory of equipment, software and instructional materials; up-date resource file and keep on-going "need list".

II. Goals and Objectives

A. State (DOE): See Exploratory Computer Literacy Curriculum Guide, Grades K-6.

B. District: Check if District has sub-goals or specific emphasis for the year.

C. School: Establish goals and objectives incorporating the State and District guidelines for short term (1 year) and long range (3-5 years) implementation.

Write specific, measurable and attainable goals within a time frame.
Example:

Long term: By the end of 1987 every class in _____ School will have received some phase of instruction in the K-6 Exploratory Computer Literacy Program. (See Phases I - V below.)

Short term: By June 1985, 50% of the students in _____ School will have completed the Phase I (see below) of the Exploratory Computer Literacy Program.

D. Grade Level: From the school's goals and objectives select specific objectives according to assessed needs and experiences of students on grade level.

Example:
During the school year 1984-1985, 80% of the students in grade ___ at _____ School will have completed the Phase I (see below) of instruction in Exploratory Computer Literacy.

E. Class: From grade level objectives, select specific performance expectations according to assessed needs and experiences of students in the class.

III. Plan of Action

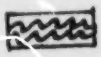
A. Activities: Select instructional activities for specific teaching objectives based on assessed needs of students and school's direction. Evaluate how well these activities enable students to meet performance expectations. The computer task force or committee in charge of the computer literacy program can divide the responsibilities of instruction into 3 to 5 phases in order to achieve the school's long term goals.
Example:

Phase I:

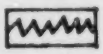
Housekeeping Rules
Care and Handling of Disks, Computers, Monitors
Management of Groups
General Rules of Conduct
Cover Objectives: 1.1 Interacts with computer
1.5 Develops positive attitudes and behaviors
3.1 Identifies/describes computer operations
Suggested Software: Introduction to Computer disk, Logo, appropriated tutorial and simulation activites.

Phase II:

Reinforce Phase I
Objectives: 1.2 Identifies computer rules
1.4 Identifies methods of communications with computer
3.2 Recognizes computer applications
5.1 Recognizes support/technical/scientific/integrated field careers
Suggested Software: Logo, BASIC, Introduction to Word Processing

Phase III: 

Review Phase I, reinforce Phase II
Objectives: 1.3 Explains algorithm/flowchart
2.1 Uses computer information system
3.3 Recognizes affects on daily life
3.4 Differentiates science/technology
4.1 Recognizes disadvantages
4.2 Identifies major applications
Suggested Software: Logo, BASIC, Word Processing, another language
Introduction to applications programs (e.g., Data Handler)

Phase IV and V: 

Review and reinforce all objectives.
Develop further confidence and competence in programming in Logo, BASIC and word processing. Continue to explore other applications programs. Utilize computer skills in as many instructional areas as possible.

B. Time Frame: Based on the goals and objectives for the school, a master schedule can be made to show how a school's computer program will progress through the years. (See sample Master Schedule p. 16.) However, each year the schedule needs to be adjusted because it is impossible to predict all of the problems or changes which may occur.

C. Scheduling: There are several considerations the school must make in deciding how computer classes will be scheduled. The number of times a class needs to utilize the lab will be determined by the number of computers available and the number of classes using the lab during any given day, week or month. The following are some ways a school can decide on the utilization of the computer lab.

1. 6-week sessions, daily instruction approximately 6 classes per session can be accommodated. (36 classes per year.)
2. Once a week, throughout school year, approximately 25 classes can be accomodated.
3. One semester, twice a week with one day per week opened to any class (make-up), approximately 10 classes per semester can be accomodated.

(See Sample Schedules A-C pp. 17-20.)

D. Management:

1. Rules on "housekeeping" and "handling and care of computer equipment and supplies" should be set by the school computer task force or committee in charge and followed by everyone who uses the computer lab. Rules for behavior, going to and from computer lab should be set by individual classes as needed. Keep rules simple and few.

2. Group students appropriately to carry out instructions effectively. Utilize total class, large group, small groups. In teaming, select compatible students for the most effective teaching-learning outcomes.

3. Students should experience hands-on as often as possible but this will entail pre-computer discussions, off-computer activities and follow-up activities in order to accommodate as many students on the limited number of computers. (See Management Procedures for Hands-On Experience, pp. 25-27.)

4. Supplies and equipment frequently used for computer instruction (e.g., overhead projector, transparencies and pens, chart paper, graph paper, etc.) should be kept in the computer lab.

IV. Evaluation

A. Students - Keep checklists (see Sample Checklist p. 21), record of worksheets, notebooks, give post-test (see Student Survey Form B6 pp. 10-13) and student evaluation (see Sample Student Evaluation p. 22.)

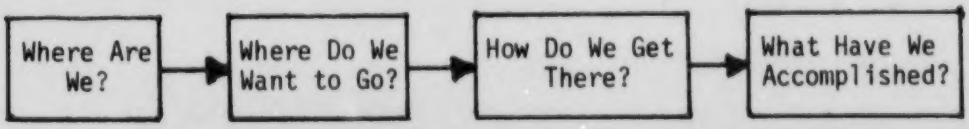
B. Faculty - Evaluate lessons, as presented, scheduling, time allotment, materials used. At end of year make recommendations to task force or committee or administrator. (See sample Teacher Evaluation Form p. 23.)

C. Parent - Conduct survey to get feedback on student attitude towards computer instruction and interest. Have parents who have helped in the lab evaluate their participation. (See sample Letter to Parents p. 24.)

D. Equipment and Supplies - Update inventories, project for future needs.

V. Summary

KEEP IN MIND:




| Assessment | Goals Objectives | Plan of Action | Evaluation |
|---|---|---|---|
| Survey<br>Pre-Test<br>Questionnaires<br>Inventories | P.E.'s | instruction<br>activities<br>formative evaluation | surveys<br>checklists<br>post-test<br>student products |

STUDENT SURVEY OF COMPUTER EXPERIENCES

1. Have you ever used a computer? _____ If yes, what kind of computer?

   _____

2. Do you have a computer at home? _____ If yes, what kind?

   _____

   Are you allowed to use it? _____

3. Have you taken any computer courses? _____ Where? _____

   _____ How long? _____

4. What can you do on a computer? (check and write in)

   Play games _____ Program (BASIC, Logo) _____

   Lessons (what kind?) _____ Word Processing (which one?)

   _____ Others (what?) _____

5. Are you interested in learning how to use the computer? _____

   Why? _____

   _____

STUDENT SURVEY - COMPUTER LITERACY
Form B6

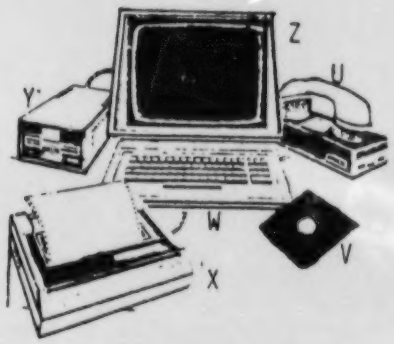
Part I.

Directions: Read the following statements about computers. If you "Strongly Agree" with a statement, circle an "A". If you "Agree" with the statement, circle a "B"; if you are "Undecided" about an answer, circle a "C"; if you "Disagree," circle a "D"; and if you "Strongly Disagree," circle an "E".

| | | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree |
|---|---|---|---|---|---|---|
| 1. | Computers treat everyone as a number. | A | B | C | D | E |
| 2. | The more computers are used, the less privacy a a person will have. | A | B | C | D | E |
| 3. | Someday most things will be run by computer. | A | B | C | D | E |
| 4. | I am not very good with computers. | A | B | C | D | E |
| 5. | Computers are fun. | A | B | C | D | E |
| 6. | Working with computers is easy. | A | B | C | D | E |
| 7. | I would like to spend more time using computers. | A | B | C | D | E |
| 8. | Using computers is too hard. | A | B | C | D | E |
| 9. | I dread using computers. | A | B | C | D | E |
| 10. | Learning about computers will be useful in my future. | A | B | C | D | E |
| 11. | I really want to do well with computers. | A | B | C | D | E |
| 12. | Using computers is boring. | A | B | C | D | E |
| 13. | Every student should have some understanding of computers. | A | B | C | D | E |
| 14. | Computers are hard to understand for most people. | A | B | C | D | E |
| 15. | Someday most people will have a computer in their home. | A | B | C | D | E |
| 16. | All students should learn how computers affect their lives. | A | B | C | D | E |
| 17. | I would like to learn more about computers. | A | B | C | D | E |
| 18. | I enjoy (or think I would enjoy) using computers in my classes. | A | B | C | D | E |
| 19. | My knowledge of what is going on in the world is more up-to-date because of computers. | A | B | C | D | E |
| 20. | Computers can be used to assist in teaching English grammar. | | | | | |
| 21. | Computers are not really used very much yet except scientists. | A | B | C | D | E |
| 22. | Government officials use computers to keep large amounts of information about citizens. | A | B | C | D | E |
| 23. | People often use computers to store large amounts of information they wish to use over and over again. | A | B | C | D | E |
| 24. | Computers have helped the world by increasing communication. | A | B | C | D | E |

Part II.

Directions: Select the best answer to the following questions and fill in the corresponding letter on the answer sheet. Refer to the diagram when answering questions 25-30.




25. U is a
(A) disk drive (B) keyboard (C) monitor (D) printer
(E) modem

26. V is a
(A) disk drive (B) keyboard (C) monitor (D) printer
(E) floppy disk

27. W is a
(A) disk drive (B) keyboard (C) monitor (D) printer
(E) floppy disk

28. X is a
(A) disk drive (B) keyboard (C) monitor (D) printer
(E) modem

29. Y is a
(A) disk drive (B) keyboard (C) monitor (D) printer
(E) modem

30. Z is a
(A) disk drive (B) keyboard (C) monitor (D) printer
(E) modem

For items 31 - 39, if you do not know the answer, fill in (E) "I don't know."

31. A computer program is
(A) a course that uses computers
(B) a set of instructions to control the computer
(C) a way to repair computers
(D) a set of mathematical equations
(E) I don't know

32. Which of the following is not a computer programming language?

(A) Pascal (B) BASIC (C) LOGO (D) TURTLE (E) I don't know

33. On a computer, the symbol * is used to indicate

(A) addition (B) subtraction (C) multiplication (D) division
(E) I don't know

34. Look at the following computer program and decide what will appear after the program is run.

```
10  PRINT "2 + 2 = " 2 + 2
20  END
```

(A) 2 + 2 = 2 + 2 (B) 2 + 2 = 4 (C) 4 = 4 (D) "2 + 2 = " 2 + 2
(E) I don't know

35. How many times will the following computer program print the word ALOHA?

```
10  PRINT "ALOHA"
20  GOTO 10
30  END
```

(A) zero (B) once (C) 10 times (D) more than ten times
(E) I don't know

36. Which set of computer instructions prints out the numeral 2 only once?

(A)
```
10  X = 0
20  X = X + 1
30  PRINT X
40  GOTO 10
50  END
```

(B)
```
10  X = 1
20  X = X + 1
30  PRINT X
40  GOTO 20
50  END
```

(C)
```
10  X = 1
20  X = X + 1
30  PRINT X
40  GOTO 50
50  END
```

(D)
```
10  X = 2
20  X = X + 1
30  PRINT X
40  GOTO 50
50  END
```

(E) I don't know

37. The following commands: FORWARD 40 RIGHT 90 FORWARD 60 RIGHT 90 FORWARD 40 RIGHT 90.

(A) form a triangle
(B) form a rectangle
(C) need another command to form a triangle
(D) need another command to form a rectangle
(E) I don't know

38. A keyboard is used mainly to

(A) check spelling
(B) turn on the computer
(C) enter information into the computer
(D) lock the computer
(E) I don't know

39. A monitor sometimes

(A) stores information in the computer's memory
(B) keeps track of things in the computer's memory
(C) turns on the computer
(D) shows what has been typed into the computer
(E) I don't know

40. Personal computers (microcomputers) first became popular around:

(A) 1950 (B) 1965 (C) 1978 (D) 1982 (E) I don't know

41. Which of the following statements is generally true:

(A) Programs written for an Apple computer will also run on a Radio Shack computer.
(B) Once it is set up in a room, a microcomuter must not be moved.
(C) Microcomputers need to be in air-conditioned rooms.
(D) A microcomputer can be used as a terminal connected to a large computer.
(E) Information has to be entered through the keyboard.

42. Which of the following statements is <u>not</u> generally true:

(A) Microcomputers can be used to play video games.
(B) Microcomputers can be used to help write books.
(C) Microcomputers can handle millions of pieces of information at the same time.
(D) Microcomputers can be used to send information over phone lines.
(E) Printers used with microcomputers can produce print that looks like it came from an electric typewriter.

Part III.

| | Computer helps a lot | Computer helps a little | Computer does not help |
|---|---|---|---|
| How much would a computer help in: | | | |
| 43. Calculating and printing bills for a credit card company? | (A) | (B) | (C) |
| 44. Keeping track of a car maker's inventory? | (A) | (B) | (C) |
| 45. Telling which food tastes better? | (A) | (B) | (C) |
| 46. Predicting election results? | (A) | (B) | (C) |
| 47. Alphabetizing lists of names? | (A) | (B) | (C) |
| 48. Writing a novel? | (A) | (B) | (C) |
| 49. Diagnosing diseases? | (A) | (B) | (C) |

FACULTY SURVEY ON COMPUTER EDUCATION

Surveys are being conducted for students, parents and faculty members so we can plan ahead in carrying out the Exploratory Computer Literacy Program in Grades K-6 in our school. These surveys will provide the information to get the necessary assistance from state, district and school levels to embark in this new area of the curriculum.

1. What courses, workshops, or training have you taken in computers? (List)

_____

_____

2. What courses, workshops, or training are you planning to take and when?

_____

_____

3. In what areas of the Exploratory Computer Literacy Curriculum would you like more help?

_____

_____

4. At the school level what kind of help would you need to get started in teaching the use of computers to your class (if you haven't already started)?

_____

_____

5. Would you be willing to help other teachers on your grade or in our school to get started? _____

If yes, in what capacity? _____

_____

6. Other comments, concerns, questions or suggestions regarding computers:

_____

_____

COMPUTER SURVEY FOR PARENTS

Dear Parents:

This survey is to gather information on the status of computer knowledge and experience among our parents. It is also a survey to find out how many parents would be interested in learning about computers if classes could be arranged.

The school also needs parental help in carrying out our computer program for our children.

We would appreciate it if you would fill out the survey and return it with your child. Thank you for your cooperation.

1. Do you know how to use a computer? _____

   What make(s)? _____

2. If yes, are you willing to teach other parents? _____

3. If no (to question 1), would you like to learn? _____

4. With or without computer experience, would you volunteer to help monitor our school's computer laboratory? _____

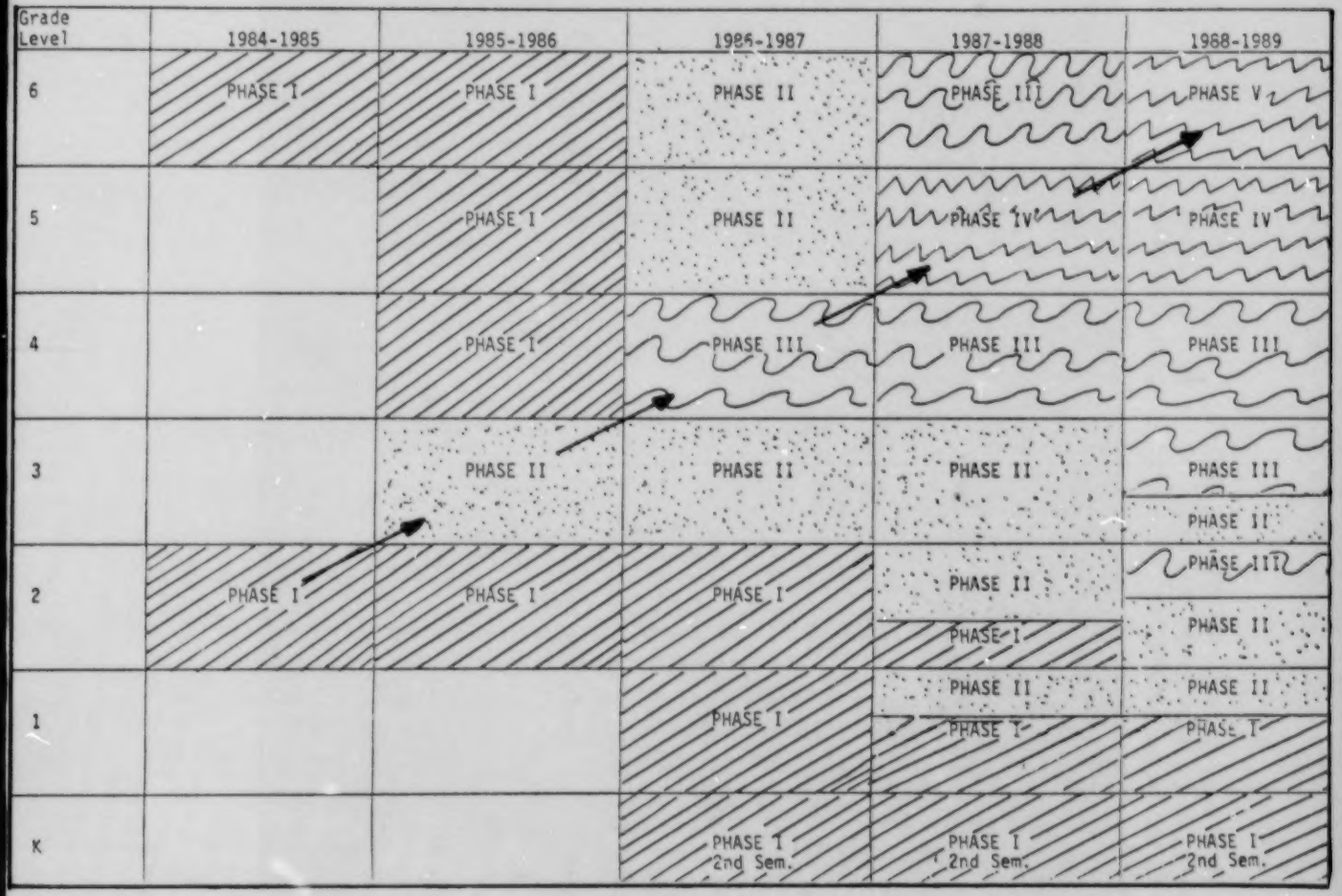
5. With your knowledge and expertise of computers, would you serve as a resource person should questions or problems arise with our computers?

   _____

MASTER SCHEDULE - EXPLORATORY COMPUTER LITERACY K-6

_____ School

1984-1989



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SAMPLE SCHEDULE A

School Enrollment 700 students

Computer Lab 9 microcomputers

| Periods | Cycle 1 * 9/10 - 10/23 10/29 - 11/2 | Cycle 2 * 11/5 - 12/20 11/7 - 1/11 | Cycle 3 * 10/24 - 10/25 1/14 - 2/20 | Cycle 4 * 2/21 - 3/22 | Cycle 5 * 4/1 - 4/30 | Cycle 6 * 5/2 - 5/30 |
|---|---|---|---|---|---|---|
| 8:15 - 9:00 | Grade 5 | Grade 6 | Grade 4 | Grade 3 | Grade 2 | 8:20 - 8:55 Grade K |
| 9:00 - 9:45 | Grade 5 | Grade 6 | Grade 4 | Grade 3 | Grade 2 | 9:00 - 9:35 Grade K |
| 10:15 - 11:00 | Grade 5 | Grade 6 | Grade 4 | 10:20 - 11:10 Grade 3 | 10:15 - 10:50 Grade 1 | 10:15 - 10:50 Grade K |
| 11:00 - 11:40 | Grade 5 | Grade 6 | KAAP - 5<br>KAAP - 6 | | 11:40 - 12:15 Grade 1 | 11:40 - 12:15 Grade K |
| 12:20 - 12:55 | K-3 Orientation | Experimental Project (Math) Grades 4 - 6 | Experimental Project (Math) Grades 4 - 6 | 12:05 - 12:55 Grade 2/3 Combination | Grade 1 | Grade 1 |
| 1:15 - 2:00 | *For each cycle 1/2 class goes to lab every other day. | Experimental Project (Math) Grades K - 3 | Experimental Project (Math) Grades K - 3 | Grade 2 | Experimental Project (Math) Grades K - 3 | Experimental Project (Math) Grades K - 3 |

SAMPLE SCHEDULE B

| | MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY |
|---|---|---|---|---|---|
| 9:15 - 9:45 | SIZE OF SCHOOL<br>Grade / No. of Classes<br>K 2<br>1 3<br>2 2<br>3 2<br>4 2<br>5 2<br>6 2 | | C-1 and C-2 HEARING AND IMPAIRED CLASSES | | GRADE 3 PROJECT |
| 9:45 | RECESS | | | | |
| 10:05-10:45 | GRADE 4 PROJECT | SLD CLASS (B-4) | GRADE 4 PROJECT | RESOURCE ROOM (SPEC. ED.) | SLD CLASS (B-5) |
| 11:15 - | GRADE 6 | GRADE 6 | 10:50-11:10 GRADE 1 | 10:45-11:15 GRADE 4 | 10:45-11:15 GRADE 4 |
| | | | 11:50-12:10 GRADE 1 | 11:15-11:45 GRADE 4 | 11:15-11:45 GRADE 4 |
| 11:45 | GRADE 6 | GRADE 6 | 12:10-12:30 GRADE 1 | | |
| 11:45 | LUNCH | | | | |
| 12:35 - | 12:35-1:05 GRADE 3 | GRADE 5 | 12:35-12:55 KINDERGARTEN | 12:35-1:05 GRADE 5 | GRADE 3 |
| 2:00 | 1:05-1:35 GRADE 3 | GRADE 5 | 12:55-1:15 KINDERGARTEN | 1:05-1:35 GRADE 5 | GRADE 3 |
| | 1:35-2:00 GRADE 2 | GRADE 2 | GRADE 2 | GRADE 2 | GRADE 2 |

SAMPLE SCHEDULE C

USE OF COMPUTER LAB

1. Grade-level assigned for use of the computer lab will be responsible for:
   a. Opening and closing of all windows.
   b. Turning on all computers and leaving them on all day. (Be sure disk drives are off.)
   c. Securing the room at the end of the day.

2. Be sure students are oriented to "Do's and Don'ts". (Rules established for computer lab.

3. Computer committee will inform you where computer lab key will be hanging. Key should be hung back at the proper place at the end of the day. Only adults should pick up, handle, return the computer lab key.

4. Computer room calendar (see next page) will be posted on the bulletin board. The grade level assigned for that week will have the morning blocks reserved but any class or grade level may sign up for open blocks of time on the calendar.

SCHEDULE FOR 2nd SEMESTER

| | |
|---|---|
| Feb. 27 - Mar. 2<br>Mar. 5 - 9 | Grade 5/GT |
| Mar. 12 - 16<br>19 - 23 | Grade 4/GT |
| Apr. 2 - 6<br>9 - 13 | Grade 6 |
| Apr. 16 - 20<br>23 - 27 | Grade 3 |
| Apr. 30 - May 4<br>May 7 - 11 | Grade 2 |
| May 14 - 18<br>21 - 25 | Grade 1 |
| May 28 - June 1 | Grade K |
| June 4 - 6 | Open |

WEEK OF: _____

| TIME | MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY |
|---|---|---|---|---|---|
| 7:30-8:00 | | | | | |
| 8:10-9:10 | | | | | |
| 9:10-10:00 | | | | | |
| 10:15-11:00 | | | | | |
| 11:00-11:45 | | | | | |
| 12:00-1:00 | | | | | |
| 1:00-2:00 | | | | | |
| 2:15-3:00 | | | | | |
| | | | | | |

Grade _____

Date _____

CHECKLIST FOR PHASE I

| NAMES OF STUDENTS | Handles and Inserts Disks Properly | Boots Program (Cold Start) | Starts Up (Cold Start) | Interacts with Computer Through Keyboard | Puts Away Materials Properly | Shuts Off and Covers Equipment | Works Well with Team Members | Works Well on Off-computer Activities | Follows Rules of Conduct | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
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✓ - Satisfactory  X - Needs Improvement

STUDENT EVALUATION
(Grades 4-6)

1. What do you think needs to be improved in our use of computers in instruction? Any ideas how?

2. What do you think was good and helpful about using computers?

3. What would you like to do next year with computers?

4. If we had a Computer Club made up of students interested in doing more with computers would you join? What would you like the Club to offer?

TEACHER EVALUATION OF COMPUTER USE

1. What would you like to see improved next year regarding our Exploratory Computer Literacy Program? (Scheduling, Physical Arrangement, Parental Assistance, etc.)

_____

_____

_____

_____

2. What kind of help would you like? (Resource, Ideas for Instruction, Management, etc.)

_____

_____

_____

_____

3. What worked well for you this year? (Explain and write source if any.)

_____

_____

_____

_____

4. Would you be interested in sharing your experiences and hearing from others about their experiences? _____

5. Are there any courses or workshops you would like to have offered this summer or in the coming school year? (If yes, write kind of course.)

_____

_____

6. What kind of supplies, software or peripherals would you like purchased for the school?

_____

_____

Dear (Parent's Name):

Thank you for your help in the Computer Lab this school year. With your help, we were able to accommodate many more students with the limited number of computers we have available in our lab.

Because this is our first year, we would appreciate it if you could spend a few minutes to answer the questions below so we can improve our Computer Lab operation.

1. Was the training you received adequate to monitor the lab? _____
   If no, what would you suggest we include?

   _____

   _____

   _____

2. Were you able to handle the students who came to the lab without their teachers? _____ If no, what problems did you face?

   _____

   _____

   _____

3. From your observations, how can we improve the lab operations?

   _____

   _____

   _____

4. Other comments and suggestions: _____

   _____

   _____

We appreciate your invaluable assistance in the computer laboratory and your cooperation in answering our questions. We are looking forward to working with you again next year.

Mahalo,

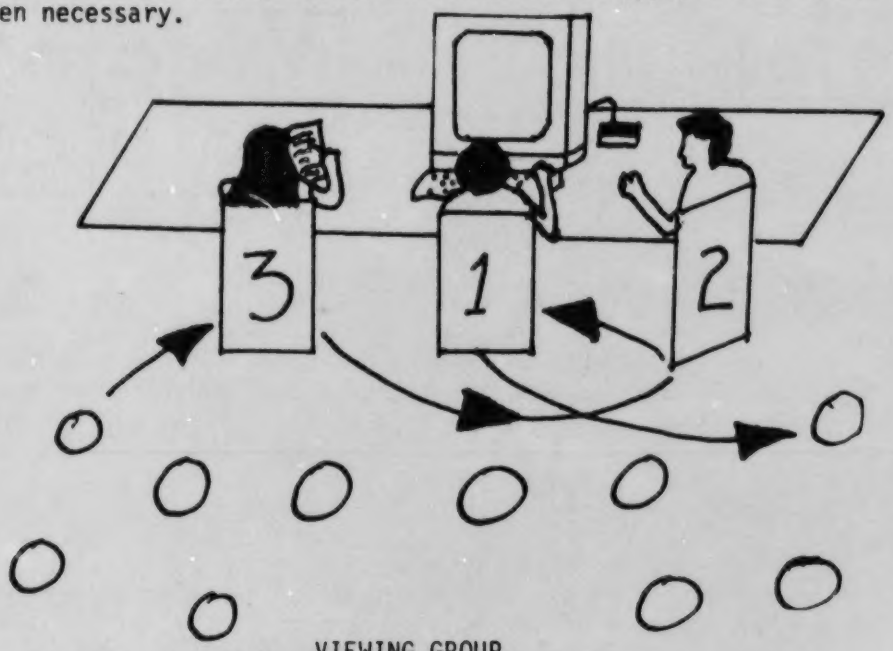
(Task Force Chairperson)

## MANAGEMENT PROCEDURES FOR HANDS-ON EXPERIENCE

I. Total Class viewing and Hands-on with 1, 2, or 3 computers.

A. Rotation sequence: from viewing group to Seat 3 to Seat 2 to Seat 1 and back to viewing group.

B. Seat 1 student work the keyboard.
Seat 2 student watch and assist when necessary.
Seat 3 student watch, assist and record what appears on the monitor when necessary.




VIEWING GROUP

C. This setting is best for general informative type instruction such as activities found in "Getting Started" Unit.

D. Teacher Preparation:

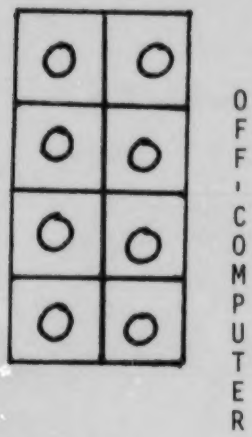
1. Check survey results on students' computer experiences to identify those students who need the particular hands-on experience of the lesson being presented.

2. Determine how long students will stay in Seat 1. Length of time will be dependent on the size of group and how the lesson is divided into parts, and number of microcomputers.

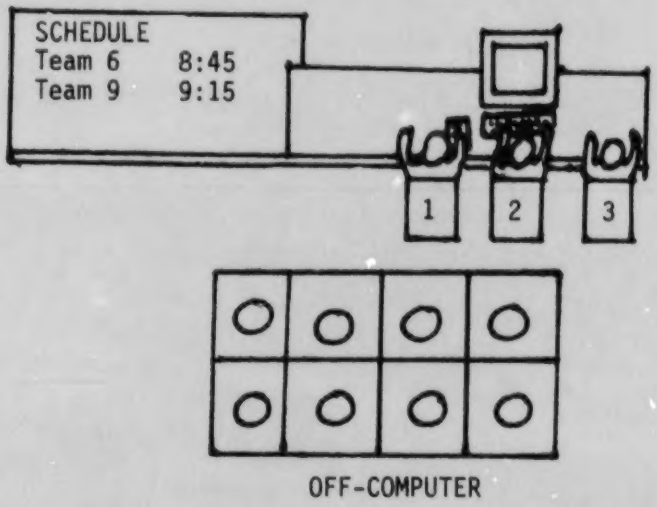
3. Prepare students on standard of behavior in viewing and the roles of students in Seat 1, Seat 2 and Seat 3. (Make a chart for easy reference and place near computer. See B above.)

4. Hook up computer to large T.V. so viewing is facilitated for large classes. (Optional)

II. Hands-on and Off-computer Activities with 1, 2, or 3 computers.



OFF-COMPUTER






OFF-COMPUTER

A. Rotation sequence the same, except entire team returns to Off-computer activities when time is up.

B. This setting is best for team approach to lessons. Tutorial programs and programming work well. Teams of 2 or 3 will go to computer to try out their lessons while rest of class is engaged in off-computer activities.

C. Teacher Preparation:

1. Prepare appropriate off-computer activites. Preferably lessons pertaining to planning for hands-on experience, reviewing, and "de-bugging" of previous on-computer activity. Regular class work can also be done during this period.

2. Form compatible groups of 2 or 3 students (students who are not too far apart in computer experience to prevent the experienced ones from taking over and doing all of the work). Students who are about the same level are best, but--never team all inexperienced students together. Try to group students so that good peer teaching and learning can take place.

3. Schedule students according to readiness of teams. Set criteria so students will know how teams are selected. Place schedule where students can see who goes next. Set time limits.

4. Look over team's program (if this is a programming lesson) to anticipate types of problems they may encounter. However, do not correct the team in advance; let students go through their lesson and see how resourceful they are in solving their own problems.

III. Independent Utilization of Computer

A. As students get better, individuals will begin to pull away from team members and will need access to computers idependently.

B. Depending on the type of program each school has these students can be accommodated in several ways.

1. A schedule of the computer lab use should be available so teachers will know when the "open" periods occur. Supervision should be available for these open periods. Schools have used parents and other trained volunteers to accommodate students during open periods.

2. Depending on how many microcomputers are available in the computer lab, individual students may be accommodated while other students work in teams.

# GETTING STARTED

BRAINSTORMING
(Pre-machine Activity)

Grades: K-3

Performance Expectations: 1.5.2 Uses positive affect words
3.2.1 Identifies applications

Curriculum Areas: Computer Literacy, Language Arts

Prerequisites: None

Materials: Chartpaper or Chalkboard

Classroom Management: Total Class

Time For Activity: One Class Period

Teacher Preparation: Using "brainstorming" techniques, elicit verbal responses from students to the following prompt:

> "Many of you have heard the word 'computer.' Some of you may even have one at home. What do you think of when you hear the word 'computer'?"

Write the word "computer" on the board (or chart). Accept all student answers. List key words from their answers on the board. Encourage all students to participate. Have children explain/expand on this discussion.

EXAMPLE: COMPUTER

Sears Toy Department

typewriter

memory

machine

games

Dad uses it to make work easy

The purpose of this activity is to establish baseline data and the entry level skills/knowledge of the children in the class. This data may be helpful to the teacher when it may become necessary to divide the class into different working groups for on-computer lessons/activity.

Follow-up/Enrichment:

1. Select some of the key words used in the "brainstorming" lesson for a class spelling list.

2. Have children find pictures of computers in magazines and newspapers to "cut and paste" for a bulletin board display. Children can display the pictures under categories of:

   - computers in occupations
   - computers in the home
   - computers in the community
   - computers in school

   Older children should be able to include written text to accompany this display.

3. View computer sound filmstrips with the class. The following titles are available from Technical Assistance Center (TAC). Select filmstrips that are appropriate to your students' level of understanding.

   - Computer Awareness - set of 4 sound filmstrips
   - Computers in Everyday Life - set of 4 sound filmstrips
   - Computer Basics - set of 6 sound filmstrips

4. Arrange a visit to your neighborhood library. Ask the librarian to explain and demonstrate the computer system. Children can observe how books are checked in/out with the "wand" that reads the magnetized strip on the card. Have the children also apply for their own computerized library card.

INTRODUCTION TO THE COMPUTER
(Pre-machine Activity)

Grades: K-3

Performance Expectations:
- 1.1.2 Reads instructions, keyboard, output
- 1.2.3 Sequences process steps
- 1.5.2 Uses positive affect words
- 3.1.1 Identifies input/output peripherals

Curriculum Areas: Computer Literacy

Prerequisites: None

Materials: Microcomputer, disk drive, printer, monitor, sample diskette

Classroom Management: Total Class

Time for Activity: One Class Period

Teacher Preparation:

1. Introduce the microcomputer and the related peripherals that the class will be using. Identify and describe the basic functions of the computer hardware: monitor or T.V. (B & W/Color, CRT), CPU, keyboard, printer, disk drive (or tape recorder, data cassette). Identify and describe how computer programs are stored: diskette, tape cassette, or cartridge.

2. If feasible, remove the cover of the microcomputer and identify the chips that store the information or data (memory).

3. Explain the function of the computer system that the children will be working with in simple, understandable terms (e.g., the microcomputer is the "brain" that can remember a tremendous amount of information; large memory capacity). Use analogies and examples in your explanations.

4. Discuss classroom rules and computer etiquette that you want the children to follow.

5. Discuss and demonstrate the basic care of the computer and diskettes. You may choose to have each student make his/her own paper diskette by following the instructions listed on the sample worksheets. Each

student will then have his/her own "diskette" to learn the proper way of handling it. For example:

- Use clean hands when working at the computer.
- No eating or drinking while working at the computer.
- Hold diskette with thumb on label.
- Do not bend or fold diskette.
- Do not touch any openings on the diskette.
- Always keep diskette in paper jacket when not in use.

6. Discuss and demonstrate the "turn on/off" sequence for your particular computer.

Follow-up/Enrichment:

1. Review computer software program that introduces the computer to the new user.
   - "APPLE PRESENTS....APPLE"
   - "THE FRIENDLY COMPUTER" (MECC)
   - "EXPLORING THE IBM PC"
2. Have children "role play" the rules for working with the computer (refer to Teacher Preparation #4 & #5).
3. Have children draw posters of the "right" and "wrong" way of handling the computer and diskette.
4. Visit an "after-hours" bank machine (LULU, OTTO, IT). Take the children to a bank or store that features self-initiating banking transactions. Have them identify the components of the machine that correlate to the one used in class. For example, the bank card is equivalent to the diskette since it stores information and must be placed in the machine to be "read." The transaction buttons are equivalent to the keyboard since this is how information is given (input) to the computer.

   Demonstrate a sample transaction and explain each step. Have the children guess or make predictions of what will happen at each step. (Note: Teachers should use own discretion in electing to do this activity since the demonstration would include the use of a personal bank card.)

## COMPUTER COMPONENTS

Grades: K-1

Performance Expectation(s): 3.1.1 Identifies input/output peripherals.

Curriculum Area: Computer Literacy

Prerequisite(s): Has had some experience working at a computer and is familiar with the names of the components.

Material(s): Copies of Computer Components (page 36) and chart paper.

Classroom Management: Total class

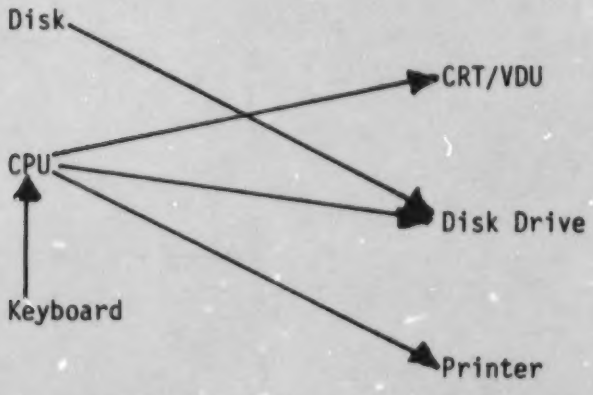
Time for Activity: One-half class period

Teacher Preparation: Make copies of Computer Components (page 36) for the class and have a chart with the names of the computer components ready.

Pre-Computer:

1. Read the questions aloud. The students can either answer orally, copy the names from the chart (if able). If the writing space is too small, students can write the number of the component on the line (number the components on the chart).

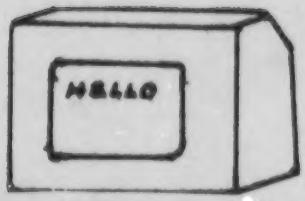
2. Draw arrows from one component to another on the worksheet or chart to show how they work together as a system.



Computer Components

I can store information.
What am I?

_____

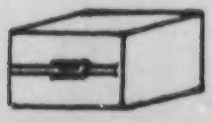


You can see information displayed on me. What am I?

_____

I can carry out program instructions! What am I?

_____

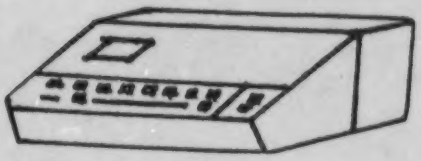


Where am I?

_____

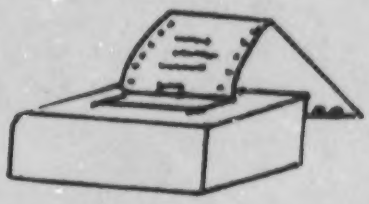
I can "read and write" information. What am I?

_____



I can help you give instructions to the computer. What am I?

_____



I can print information on paper. What am I?

_____

YOUR NAME_____ DATE_____

## PAPER GRAPHICS

Grade: Kindergarten

Performance Expectation(s): 1.5.1 Seeks work/play with computer

Curriculum Area(s): Art

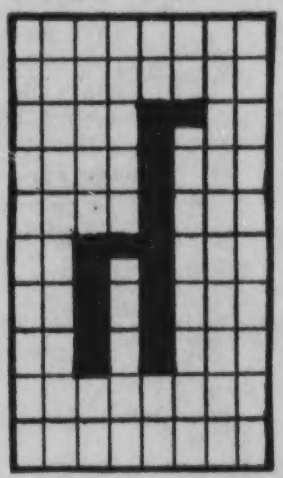
Prerequisite(s): None

Materials(s): 9x12 sheets of construction paper, 1" squares of construction paper, glue, disk for Running BASIC program.

Time for Activity: One class period

Teacher Preparation: Gather materials. Use the following BASIC program for Apple to instruct the computer to design figure:

```
10  REM GIRAFFE
20  GR
30  COLOR=1
40  VLIN 12, 17 at 19
50  PLOT 20, 12
60  VLIN 6, 17 at 21
70  PLOT 22, 6
80  ENC
```



Pre-Computer:

1. Brainstorm the many different kinds of figures that can be created using 1" square pieces of construction paper laid side by side.
2. Assign or have students select ideas to be carried out.
3. Create, paste/glue, and share products.

Hands-On:

1. RUN the BASIC program to show that computers can be instructed to create graphics on the screen.

## UNDERSTANDING AND IDENTIFYING INPUT AND OUTPUT FUNCTIONS AND DEVICES

Grades: 4-6

Performance Expectations: 3.1.1 Identifies input/output peripherals
3.1.2 Describes functions input, output, processing components

Curriculum Area: Computer Literacy

Prerequisites:

1. Teacher understands meaning and functions of the following terms:

   input - information entered into the computer (intangible)
   input device - peripheral device that allows user to enter information into the computer, like the keyboard.
   output - information reported by CPU to any peripheral device. Generally, any data that leave the computer.
   output device - peripheral device that allows user to see or hear information, like a monitor.
   central processing unit (CPU) - "brain" of computer which controls what the computer does. Processes information and sends out to output devices.

2. Teacher knows how to start up demonstration disk

3. Check lessons on input-output for Grades. K-3, pp. 34-36.

Materials: Phonograph, any record, cassette tape recorder, blank cassette tape, microcomputer system (keyboard unit, monitor, disk drive), available software (demonstration disk which comes with computer system upon purchase). Copies of Input and Output Devices p. 41 (optional).

Classroom Management: Total Class

Time: 1 class period

Teacher Preparation:

1. Set up phonograph to play record.
2. Set up computer system for demonstration.
3. Set up cassette tape recorder.
4. Duplicate any worksheet(s) to be used. (See pp. 41-42.)

Pre-Computer:

1. Discuss with students meaning of each word "input" and "output". When you hear or see the word "__put" what does it mean to you, what do you think about?"

2. List on the board the ideas, definitions given by students. Example:

| INPUT | OUTPUT |
|---|---|
| 1. Put in something | 1. Put out something |
| 2. To say something at meeting | 2. A product |

3. Next have students think of input-output systems. Provide sample:

   Input - read directions
   Output - follow directions.
   Processing - thinking of what is read and what must be done and doing it.

   Do several with students in various subject areas or physical activities.

4. Put record on phonograph and play. Ask students how input and output is demonstrated on the phonograph. (What is on record is the input and the music or sound is the output. The input components of the phonograph are the needle and pick-up system, the output component is the amplifier. The phonograph is the input/output (I/O) device.

5. Next, show students the blank cassette tape. Ask students what is it like in the phonograph system (record). Place tape into recorder and press play. Ask students why nothing is coming through. (Recorder broken, not plugged in, tape is blank, etc.)

6. Rewind tape then set it to "record" without explaining what you are doing. Then proceed with discussion which will be taped.

   "If the tape was blank what would you need?"
   (Input - some kind of information or sound.)
   "Was input and output demonstrated with the cassette recorder? Explain."
   (No, because there was no input - information - nothing came out of the machine even if the machine parts and tape moved.)

7. Stop tape recorder. Rewind and play tape of discussion. Have students identify the input and the output.
   "Is the recorder an input or output device?" (both)
   "Can anyone explain?" (Recorder functions as input device when on 'recording' and output device when on 'play')
   "Who can explain the cassette tape?" (the tape and the microphone are the input components, the discussion is the input - information.)

"What are the output devices?" (The magnets which pick up the sounds and the amplifier which puts out the sound are the output components. The recorder is the output device when on 'play'.)

8. Proceed in the same manner with the computer. Put disk in disk drive and start demonstration. "Who can identify and explain the input or output components and devices in operation?" As students volunteer to explain, ask others who are listening whether they agree or not.

9. Explain to students that another important function takes place inside the computer. The information fed into the computer does not necessarily come out in the same way. The "user" can use the information through the keyboard and the computer will process (work on and arrange the information to send it out through the monitor).

   Demonstrate by responding to software output on monitor.

   Continue to explain that this part of the computer, "the brain", is called the central processing unit (CPU). Although a lot of information goes into the computer, only what the user wants or needs is shown on the output device. The computer waits for commands to do what the user wants.

10. Summarize and review by pointing at each component or device and have students respond, "input", "output" or "both".

Follow-up/Enrichment:

1. Use worksheets on pp. 41-42 as off-computer activities during another period.

2. Have students collect pictures of various computer peripherals (joystick, printer, terminals, etc.) and paste on charts labeled: INPUT, OUTPUT, INPUT/OUTPUT.

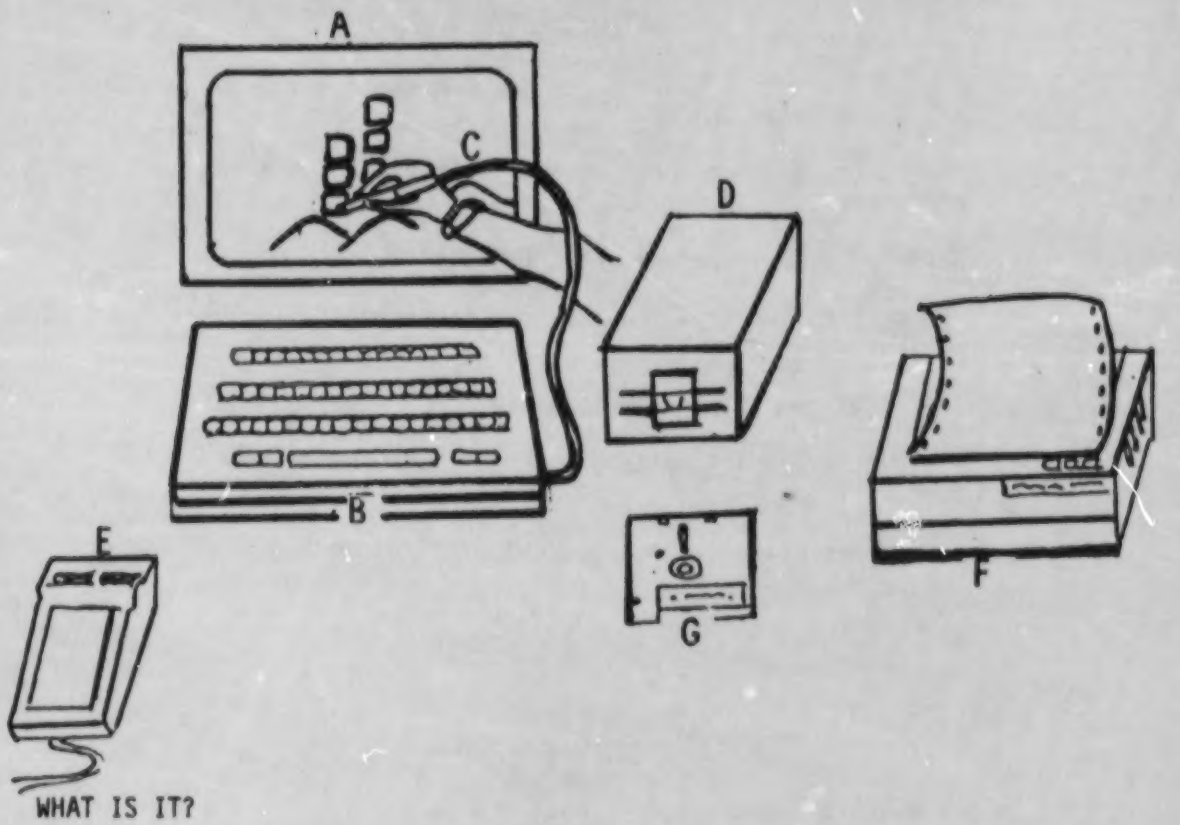
3. Role play input, output functions. (See scenario on p. 43.)

Comments and Suggestions:

1. Look at activities in K-3 section of Getting Started Unit and adapt to use with grades 4-6.

2. Locate appropriate filmstrips or 16mm films which cover this area. (See TAC Resource Listing on pp. 195-201.)

## INPUT AND OUTPUT DEVICES




WHAT IS IT?

___ Printer
___ Graphic Tablet
___ Floppy Disk
___ Keyboard
___ Monitor
___ Light Pen
___ Disk Drive

Is it input (I), output (O) or Input/Output (I/O) device?

___ Printer
___ Keyboard
___ Floppy Disk
___ Monitor
___ Light Pen
___ Disk Drive
___ Graphic Tablet

## REVIEW INPUT/OUTPUT

Write true (T) or false (F).

____1. The function of an input device is to put information into the computer.

____2. A floppy disk is part of an input device.

____3. The most common input device on microcomputers is the video screen or monitor.

____4. The light pen is an output device.

____5. The disk drive like a tape recorder is both an input/output (I/O) device.

____6. The printer also is an input/output (I/O) device.

## REVIEW FUNCTIONS

Put in the matching number before each statement.

____a. Loads a stored program into the microcomputer.

____b. Gives instructions to the microcomputer.

____c. Saves the program for future use.

____d. Makes a typed copy of program.

____e. Draws a picture.

____f. Displays letters or pictures.

1. printer
2. keyboard
3. monitor
4. disk drive
5. graphic tablet
6. floppy disk

## ROLE PLAY SCENARIO

### Input Output Functions

PLAYERS: (5 characters) User, keyboard, CPU, monitor, printer

MATERIALS: Large cardboard keyboard, flannel letters and digits cutouts, flannel board for monitor, chalk and chalkboard for printer. Large labels to be worn by characters: USER, KEYBOARD, CPU, MONITOR, PRINTER.

PLAY: User pretends to type on cardboard keyboard held by character-keyboard. Character-keyboard calls out each letter or number typed. Character-CPU picks up proper flannel letters and numbers as called and places on flannel board held by character-monitor. User types "print". Character-printer on cue goes to chalkboard and writes what appeared on monitor (flannel board).

AUDIENCE: Prepare students that the role play is a very simplified demonstration of the functions of the computer.

Suggestions: Students can take this brief scenario and write a more elaborate play which will teach others about the computer by adding other elements: error messages, sound synthesizers, etc. It can also be developed into a fantasy utilizing students' imagination.

## GETTING ACQUAINTED WITH THE COMPUTER

Grades: 4-6

Performance Expectations:
1.1.1 Recognizes computer instructions
1.1.2 Reads instructions, keyboard output
1.1.3 Uses control keys/commands

Curriculum Area: Computer Literacy

Prerequisites:

1. Students understand "input" and "output".
2. Teacher knows how to "boot" system and is familiar with the software she will use for lesson.
3. Teacher is familiar with Management Procedures for Hands-On Experience pp. 25-27.

Materials: Introductory software on use of computer (e.g. "Apple Presents Apple" for Apple IIe, "Exploring the IBM Personal Computer" for IBM PC, or any tutorial or simulated activity software), computer system(s), R.F. Modulator cable (optional), large classroom T.V. (optional).

Classroom Management: Total Class

Time for Activity: 1 or 2 class periods

Teacher Preparation:

1. If utilizing large classroom T.V. for better viewing, connect it via an R.F. modulator cable to computer system. Adjust for sharpest image.
2. Go through software being used and note at what points students can be rotated for hands-on experience. Plan how much time to allot for lesson (1 or 2 periods). Consider class enrollment, number of students who need hands-on experience, and number of computers being used.
3. Go over procedure for hands-on experience (see p. 25 Management Procedures Hands-On Experience, Part I, Total Class Viewing and Hands-on). If chart is available, place it near computers.

Pre-Computer:

1. Review briefly what students remember about input and output.

2. Explain to students that they will all have a chance to experience input (at keyboard) if they have not had opportunities before.

3. Go over procedure on how they will take turns using chart (if available). Go over expectations for viewing behavior.

Hands-On:

1. Have students stand around computer and T.V. screen. Make sure everyone can observe student(s) and monitors.

2. Demonstrate how to start up system. Review how to handle disk by the label and place it properly into disk drive.

   a. Turn on monitor(s) to warm up (few seconds).
   b. Turn computer on, disk drive will whir and red light will go on.
   c. Watch monitor to know when disk is completely loaded.

3. Seat the first three students at the computer(s).

4. Read out loud or have one student read what appears on the monitor. Have student(s) respond at keyboard(s).

5. Announce when it is time to rotate keyboard users.

6. Comment wherever necessary to point out important parts of lesson.

7. When lesson or period is up (whichever comes first) demonstrate how to turn off computer or restart software.

8. Discuss briefly that the demonstration could not be complete without the "users" input. Also point out the need to read computer instructions before responding on keyboard and checking the monitor to see if response is correct.

9. Inform students they will have opportunities to continue (if not finished), to review (by choosing a program from the "menu") and to practice on the same demonstration software.

Follow-Up/Enrichment:

1. If lesson not completed, follow up at next computer class period and demonstrate how to get directly to the menu, bypassing introductory passages. (On Apple IIe with "Apple Presents Apple" after starting up, press ESC before the introductions begin.)

2. Use appropriate tutorial software (in mathematics, language arts, social studies, etc.) and follow procedure so students can interact with the computer and also become aware of various kinds of software.

## HOW A COMPUTER WORKS

Grades: 5-6

Performance Expectations: 3.1.2 Describes functions input, output and processing components.

Curriculum Areas: Language Arts, Computer Literacy

Prerequisites:

1. Should have completed activity: Understanding and Identifying Input and Output Functions and Devices, pp. 38-40.
2. Teacher must go through Owner's Manual of computer being used to be able to point out and explain internal structure.
3. Teacher knows how to start-up disk.

Materials: Computer system unit (keyboard unit, monitor, disk drive, software), sample silicon chip (ask company where computer was purchased for old used chips), diagram of Apple IIe motherboard (see diagram pp. 50-51) software (tutorial or simulated activity) and 3x5 cards.

For teacher's background information: Owner's Manual; Random House, Spotlight on Computer Literacy, pp. 1-29; Teaching and Computers, Charter Issue, Sept. 1983, pp. 15-17.

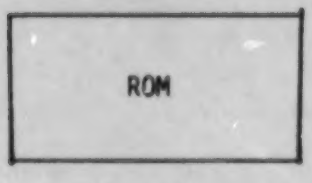
Classroom Management: Total Class

Time: 1 or 2 class periods

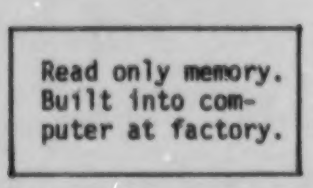
Teacher Preparation:

1. Know how to open computer to expose circuitry.
2. Make large wall chart of motherboard (for Apple IIe see diagram on p. 50).
3. Run off copies of diagram for each student (optional).
4. On 3x5 cards write: First set in one color for such terms as ROM, RAM, CPU, and parts which are covered in lesson. Second set in another color with the definition or description of each term.

Example:




in red




in blue

Pre-Computer:

1. Open computer to expose inside.
2. Explain to students what they see is the "motherboard" of the computer.
3. Point to the black rectangular block which houses a computer chip. Pass sample computer chip around. Explain that though the chip is small it has thousands of message pathways which are called "electrical circuits". If a microscope is available, students can examine circuits on the chip.
4. Point to the "Central Processing Unit" or "CPU" (which is a chip), explain that messages travel from the various chips to the "Processor" and back. The CPU is the "brain" of the computer.
5. Point to rows of chips which are "ROM" (Read Only Memory, permanent memory storing program built into computer by manufacturer which cannot be changed. Data can be read from ROM into CPU.) "RAM" (Random Access Memory, temporary memory, stores programs user writes, or programs loaded in from disks. It can be changed, can also be displayed and printed. It is lost when power to the computer is turned off.)
6. Point out slots for "interface" cards. (Interface cards expand the computer's capability and provide links to disk drive, printer and telephone modem.)
7. Point out "power supply" unit (converts 110 volts from wall outlet to 5 or 12 volts needed for computer.)
8. Point to "speaker" (produces variety of sounds).
9. Point to "input/output ports" (ja... which connect CPU to monitor, disk drive, etc.)
10. Discuss importance of keeping the "motherboard" free of dust and other contaminants like food and moisture.

Hands-On:

1. Demonstrate function of parts with software (tutorial or simulated activities). Have students imagine what is happening inside the machine. Call on students to explain or teacher can explain. Example: Disk in disk drive - the metallic head in disk drive picks up magnetic impulses from the disk and transfers it to be stored in the RAM chip.

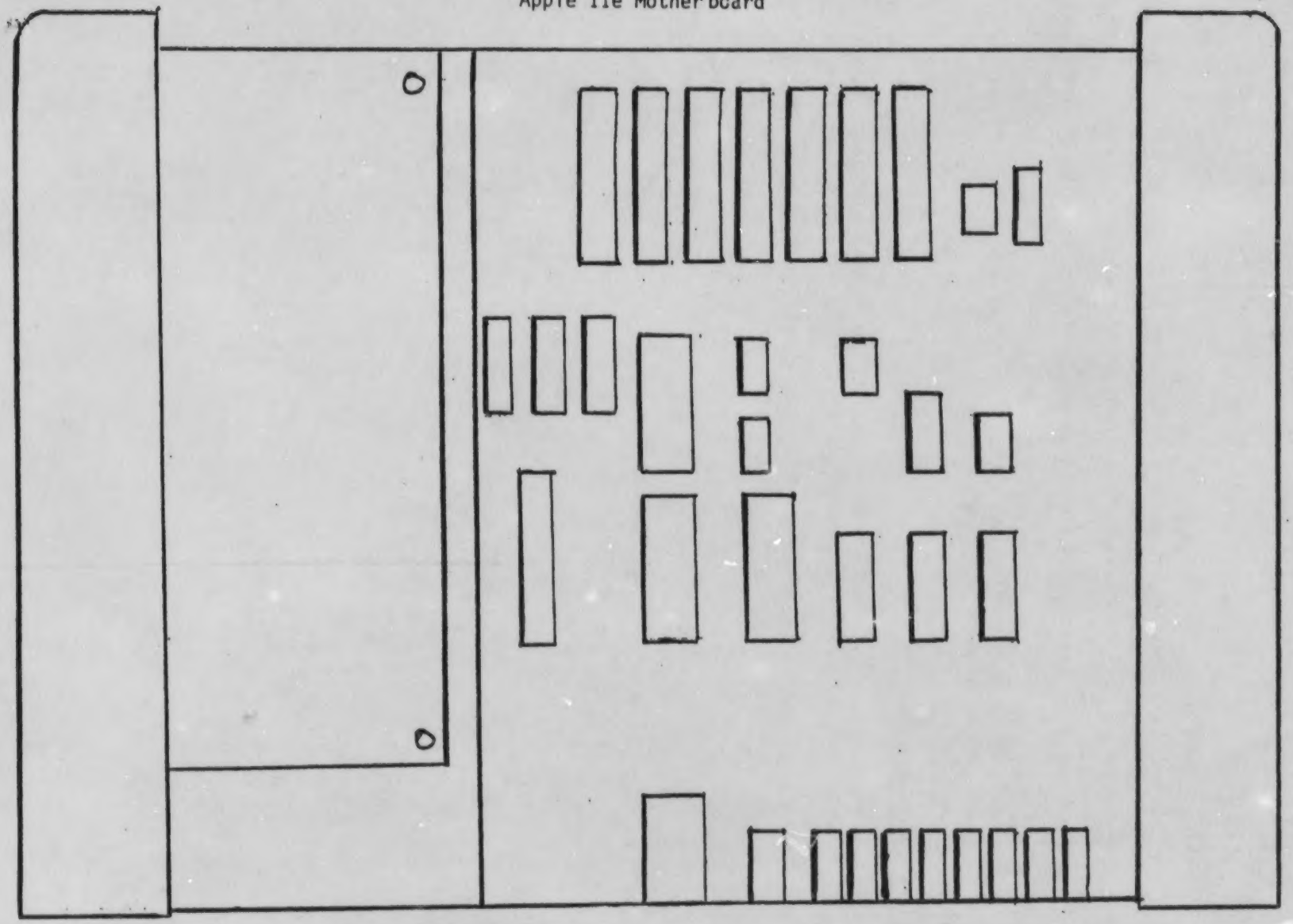
2. Have students take turns at keyboard to respond to software program, calling volunteers to explain.

Follow-up/Enrichment:

1. Use prepared 3x5 cards to play matching games, extemporaneous speeches for red cards, reading blue cards and calling out the parts, etc.

2. Have students find other ways in which games can be played with the cards or create new games for the parts and functions of computers.

Apple IIe Motherboard

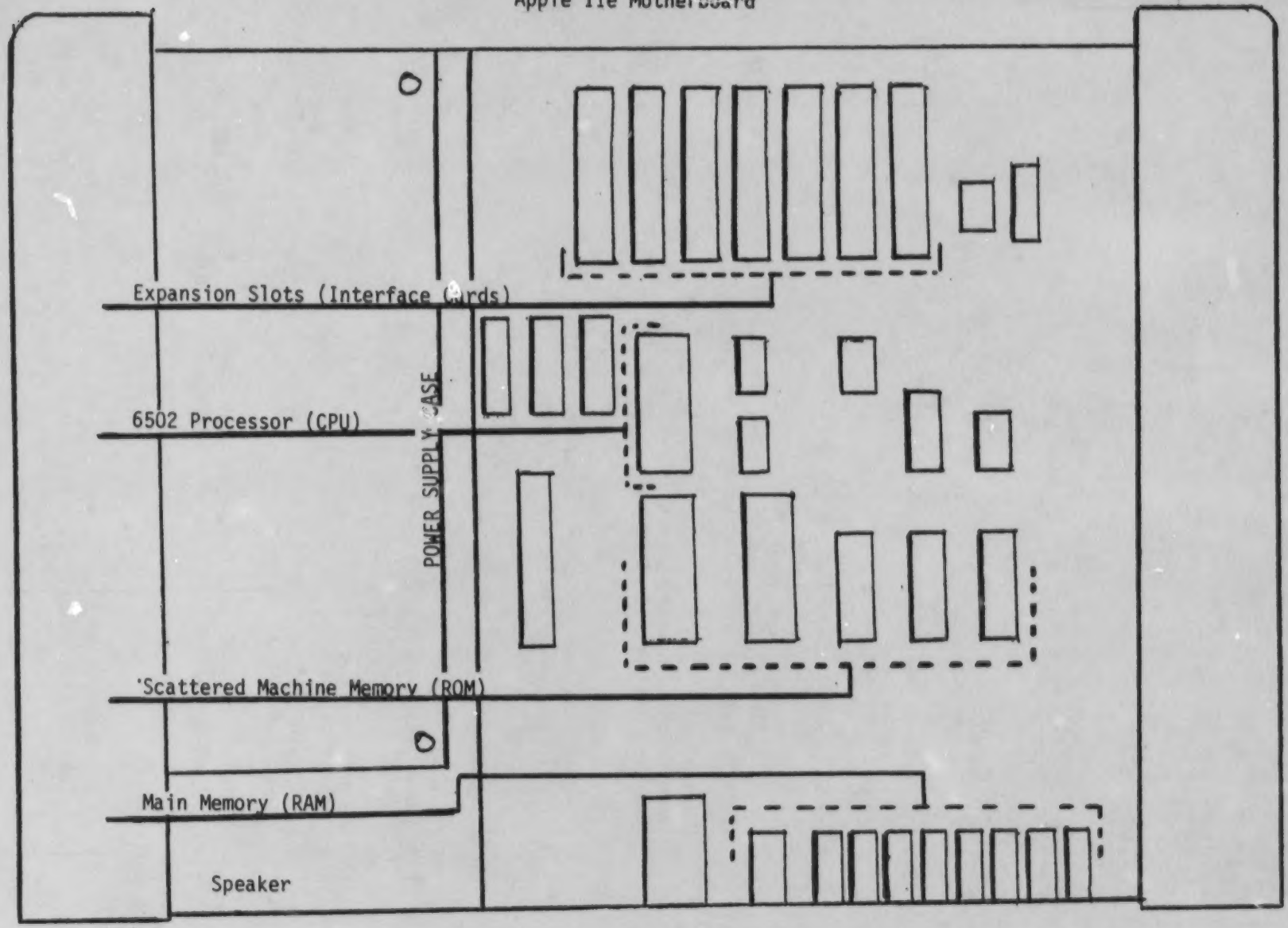


50

54

55

Apple IIe Motherboard



## USES OF COMPUTERS IN BUSINESS AND INDUSTRY

Grades: 4-6

Performance Expectations: 3.2.1 Identifies applications

Curriculum Areas: Language Arts, Computer Literacy

Prerequisites: Students must have had writing lessons in:

Grade 4: Entertaining
Grade 5: Giving Information
Grade 6: Promoting Ideas

Materials: Filmstrip or films which show the use of computers. (See TAC Resource list pp. 195-201) Examples include:

Filmstrips:
"Understanding Computers". Sunburst.
"Computer Awareness". SVE.

or Films such as:
"Computer and You". Journal Films, Inc.
"Computers: Tools for People". Churchill Films.

Classroom Management: Total Class

Time for Activity: 1 class period

Teacher Preparation:

1. Preview filmstrip or film selected for viewing; take notes on various applications shown on the films.

2. Develop teacher background through books such as Spotlight on Computer Literacy by Ellen Richman, Random House.

Activity:

1. Begin by asking, "Computers affect our lives every day in many ways. Can you name the places where you have seen computers being used?" (Banks, markets, airline counters, business office, etc.) List students' suggestions on board.

2. After some discussion on the topic tell students they will view a film or filmstrip to see if there are other uses of computers which were not mentioned.

3. Show film or filmstrip.

4. After viewing, discuss those uses not listed on the board and add these.

5. Discuss how businesses, industries, government agencies, and large organizations use computers. (Information retrieval, data processing, process control and simulation) and why (faster, greater storage-memory, one computer takes care of several machines, etc.)

6. Have students select one of the following topics (teacher can add to this list) or make up their own:

   Grade 4: The Day the Bank Machine Went Crazy
   One Day in Robbie Robot's Life

   Grade 5: Research on any type of specialized computers or specific uses: data processing, information retrieval, process control and simulation

   Grade 6: Doctors Should Not Use Computers for Diagnosis
   Doctors Should Use Computers for Diagnosis
   Robots Replace Workers (Give good or bad effects)
   Computers Will Take Over the Thinking

7. Have students read their papers to groups of 5-6 (each taking a turn). After each reading have students in each group discuss whether they were in agreement with the writer, and explain the reasons for their opinions.

Follow/Up:

1. Revise and re-write papers after discussion to be displayed in the school library, computer laboratory or classroom.

2. Go on field trips to see computers in operation (Hawaiian Telephone, PRI, hospitals, airlines, banks, hotels, etc.)

Comments and Suggestions:

This lesson can be used to meet any of the performance expectations where films or filmstrips are used to teach computers as a TOPIC.

## COMPUTERS IN LOCAL WORK/CAREER

Grades: 4-6

Performance Expectations: 5.1.1 Identifies local services/personnel

Curriculum Areas: Language Arts, Computer Literacy

Prerequisites:

1. Students must have completed lesson: Uses of Computers in Business and Industry p. 52-53.
2. Teacher must be familiar with interviewing procedures.

Materials: Ditto master, ditto paper

Classroom Management: Total Class

Time for Activity: Two separate class periods

Teacher Preparation: Be prepared to role play interviews with students.

Activity:

1. Ask Students, "Who do you know in your family or around your neighborhood who uses a computer at work?" If there are no responses to this question ask, "What kinds of work do people in your family and neighborhood do?" List all responses.
2. Have students look at list and take each job listed and ask, "Do you think this type of work uses computers?" When the list is complete, "Let's find out by interviewing these people!"
3. Ask students whether they know what interviewing is. "When is an interview used?" "What are some questions they'd like to ask?" "What is the purpose of this interview?"
4. List questions students suggest on the board. Some of them might be:
   - What kind of work do you do?
   - Do you use a computer at work?
   - Are there computers at your working place?
   - Who uses them?

- What kind of computers are used?
- Does the company train you to use them?
- How do you feel about computers?
- What is the future of computers in that business?
- Would you suggest I learn to use the computer well?

5. Role play an interview for the class with a student using these questions. Then have pairs of students interview each other.

6. Assign as homework an interview with a family member, good family friend or close neighbor. Be sure students understand how to set an appointment, to establish purpose for the interview and to be pleasant.

7. Run off the suggested questions and see that each student takes a questionnaire home which should be brought back at the next computer period.

Follow-Up/Enrichment:

1. At next computer period show students how to tabulate results. Make a large chart.

2. Look at tabulated results and ask students what stands out to them. (For example, there are similar types of work, similar kinds of computers; or mostly women use computers or most people who work in offices use computers, etc.)

3. Ask students what can they do with the information. (Make a list of all the occupations which use computers. Find out why other types of work don't use computers. Categorize the kinds of training companies provide. Compare the training and how workers feel about computers.)

4. Check Want Ads to find out what kinds of employers are advertising for computer positions.

Comments and Suggestions:

For classes and students who are ready, results can be tabulated by percentages of those interviewed as a mathematics exercise. The tabulation of results could also be done on a spreadsheet program.

LOGO

## INTRODUCTION TO LOGO: "MR./MS. ROBOT"

Grades: K-3

Performance Expectations: 1.1.1. Recognizes computer instructions
1.2.3. Sequences process steps
1.4.1. Recognizes programming languages

Curriculum Areas: Computer Literacy, Arithmetic

Prerequisites: Knowledge of left/right orientation.
Ability to count 1 - 100.

Materials: Two 18" x 24" tag boards (to make a "sandwich board" decorated as a robot). Masking tape. One adult volunteer.

Classroom Management: Total Class

Time For Activity: One Class Period

Teacher Preparation: Prepare "sandwich board" and find an adult volunteer.

Pre-Computer:

1. Introduce "Mr. Robot" or "Ms. Robot" to the children. Explain that he/she only understands certain instructions (such as "right, left, back, forward"). Demonstrate by giving commands how you can make Mr./Ms. Robot move around the room (e.g. "Mr./Ms. Robot, go forward 4 steps. Go back 2 steps, turn right, turn left). Explain how Mr./Ms. Robot will not execute a direction if it is not in his/her repertoire of skills (e.g. When asked to jump 4 times, Mr./Ms. Robot will respond, "I do not understand how to jump."). The response from Mr./Ms. Robot is what the children can expect from the computer when given an improper message. Discuss how Mr./Ms. Robot will do exactly what you tell him/her to do when using proper commands.

   Show how Mr./Ms. Robot will even make a mistake if the "programmer" makes a mistake. Discuss how the mistake can be corrected.

2. Making A Square (Writing Our First Program)

   With masking tape, outline a square on the floor. Ask the children to direct Mr./Ms. Robot to trace the square. As the children decide on the commands, write them down on the chalkboard. Allow the children

to make as many mistakes as it takes to complete this task. Observe the type of predictions children make. Encourage participation/ response from all students.
After completing the square, examine the commands written on the board to make the square. Are the children able to "discover" that each side of the square is the same number of steps; that executing the corners is always a right turn? Are children able to see a pattern emerging from this list of commands?

3. Additional Practice Activities:

   a. Continue with Mr./Ms. Robot activities. Have the children direct Mr./Ms. Robot from the back to the front of the room or from any Point A to Point B. Have the children predict/estimate the number of steps to accomplish the task.

   b. Divide the class into 2 (or more) groups. Have the children write down the commands to get Mr./Ms. Robot from the teacher's desk to the sink (or front door). The group that can accomplish the task in the least amount of steps wins!

   c. Write commands to direct Mr./Ms. Robot to make a triangle and a rectangle.

Hands-On: Enter the commands developed by the class to make Mr. Robot "walk" the square on the computer. Explain that making a right turn is 90 degrees. Explain that abbreviations are used for certain commands:

right = RT

left = LT

forward = FD

back = BK

# WRITING A LOGO PROGRAM

Grades: K-3

Performance Expectations:
- 1.1.1 Recognizes computer instructions
- 1.1.3 Uses control keys/commands
- 1.1.5 Experiments as a user
- 1.2.3 Sequences process steps
- 1.4.1 Recognizes programming languages

Curriculum Areas: Computer Literacy, Arithmetic

Prerequisites: Orientation of left/right orientation
Knowledge of simple Logo commands: LT, RT, BK, FD
Ability to correct typing errors on the computer

Materials: Graph Paper, Pencil

Classroom Management: Pre-computer = Total Class
Hands-on = Small Groups

Time For Activity: Pre-computer = One Class Period
Hands-on = Half Class Period per group

TEACHER PREPARATION:

Pre-computer: Discuss and explain to student that giving instructions to the turtle requires two conditions:

1. direction they wish the turtle to move, and
2. number of steps they wish turtle to take.

Example: RT (direction) 50 (number of steps) LT 100

(direction) (number of steps)

Using graph paper, explain to the students that each square represents "one step." Starting at the middle of the paper (or any pre-determined point marked with an "x"), teacher can direct students to draw straight lines on their own graph paper. As instructions are given to turn right or left, the teacher can describe it as a "corner turn" that is

equivalent to 90 degrees or meaning that the turtle is turning in a left (or right) direction. The teacher should also write the commands on the board using the appropriate abbreviations.

Example:

| | Teacher Instructions | Written Instructions |
|---|---|---|
| 1. | Listen carefully as I give you some directions. We will be drawing a "mystery design." If you follow my directions correctly, you will discover what the design is. | |
| 2. | Place your pencil on the "x." This is the starting point. | |
| 3. | Go forward 10 steps. | FD 10 |
| 4. | Make a right corner turn or turn right 90 degrees. | RT 90 |
| 5. | Go forward 10 steps. | FD 10 |
| 6. | Make another right corner turn. | RT 90 |
| 7. | Go forward another 10 steps. | FD 10 |
| 8. | Make a right turn of 90 degrees. | RT 90 |
| 9. | Go forward another 10 steps. | FD 10 |
| 10. | You should be back on the "x." | |
| 11. | What is the mystery design? (answer: square) | |

Hands-On: Have each small group transfer the procedures used for making the square from their graph paper to the computer. Have the small groups experiment in making smaller or larger squares. Have groups discover the parameters for the largest square without going off the screen. Instruct group recorder to write all procedures in a notebook.

Follow-Up Enrichment:

1. Assign each small group to develop a set of commands for their own "mystery design" to present to the total class.

2. Have students make squares using a left corner turn.

## PLAY COMPUTER

Grades: 1-3

Performance Expectation: 1.1.2 Reads instructions, keyboard, and output.

Curriculum Area: Computer Literacy

Prerequisites: None

Materials: Blackboard, chart and drawing paper, Logo disk.

Classroom Management: Total class

Time for Activity: One-half to one class period.

Teacher Preparation: Draw the figure in Pre-Computer section on the blackboard. Prepare a chart with the following instructions.

```
TO SQUARE
REPEAT 4 [FD 50 RT 90]
END
TO ROOF
PU
FD 50
PD
RT 30
FD 50
RT 120
FD 50
END
```

(Go to the next column)

```
TO DOORWAY
PU
RT 90
FD 20
PD
LT 90
FD 25
RT 90
FD 15
RT 90
FD 25
END
```

(Go to the next column)

```
TO HOUSE
CS
SQUARE
ROOF
PU
HOME
DOORWAY
END
```

Pre-Computer: Give the following instructions to the students:

1. Look at the figure on the blackboard. How can you "break up" this figure into smaller parts? Can you "break up" this figure into three parts and give each of the parts a name?

2. Can you draw each of the three parts using one continuous line? In other words, you would only lift your pencil when going from one part to the next. In what direction would our pencil move?

3. Make a dot in the center of the drawing paper.

4. Place your pencil on the dot and begin your drawing. Remember to use three continuous lines to draw three parts and to lift your pencil only when going from one line to the next.

5. List the names that were given the three parts. Have three students draw the parts to make a complete figure on the blackboard.

6. Develop Logo instructions for each part following example provided in Writing a Logo Program, pp .

Hands-On:

1. One way to draw this figure can be demonstrated on the computer. Have students take turns typing in the instructions as they read the steps aloud from the chart. Run the program.

Follow Up/Enrichment: Have students experiment with other ways of drawing this figure both on- and off-computer. Discuss which way the students prefer to draw the figure on-computer, off-computer, and for what reasons.

## TURTLE TURNS/FORWARD COMMAND

Grades: 1-3

Performance Expectations: 1.5.1 Seeks work/play with computer

Curriculum Area: Computer Literacy

Prerequisites: Understands turning to the right, turning to the left and going forward.

Materials: 2 copies of Turtle Turns (page 66), 2 manila folders, oaktag and felt pens.

Classroom Management: Small groups (two groups of two students)

Time for Activity: One-half class period

Teacher Preparation: Make copies of Turtle Turns (page 66), glue the grid in the folders, cut out the two round markers, back them with cardboard, mark them with colored felt pens to distinguish between the two and place them in a small pocket in the folder. Cut the oaktag into about 20 2"x3" cards and write FORWARD 1, TURN RIGHT, or TURN LEFT on each card.

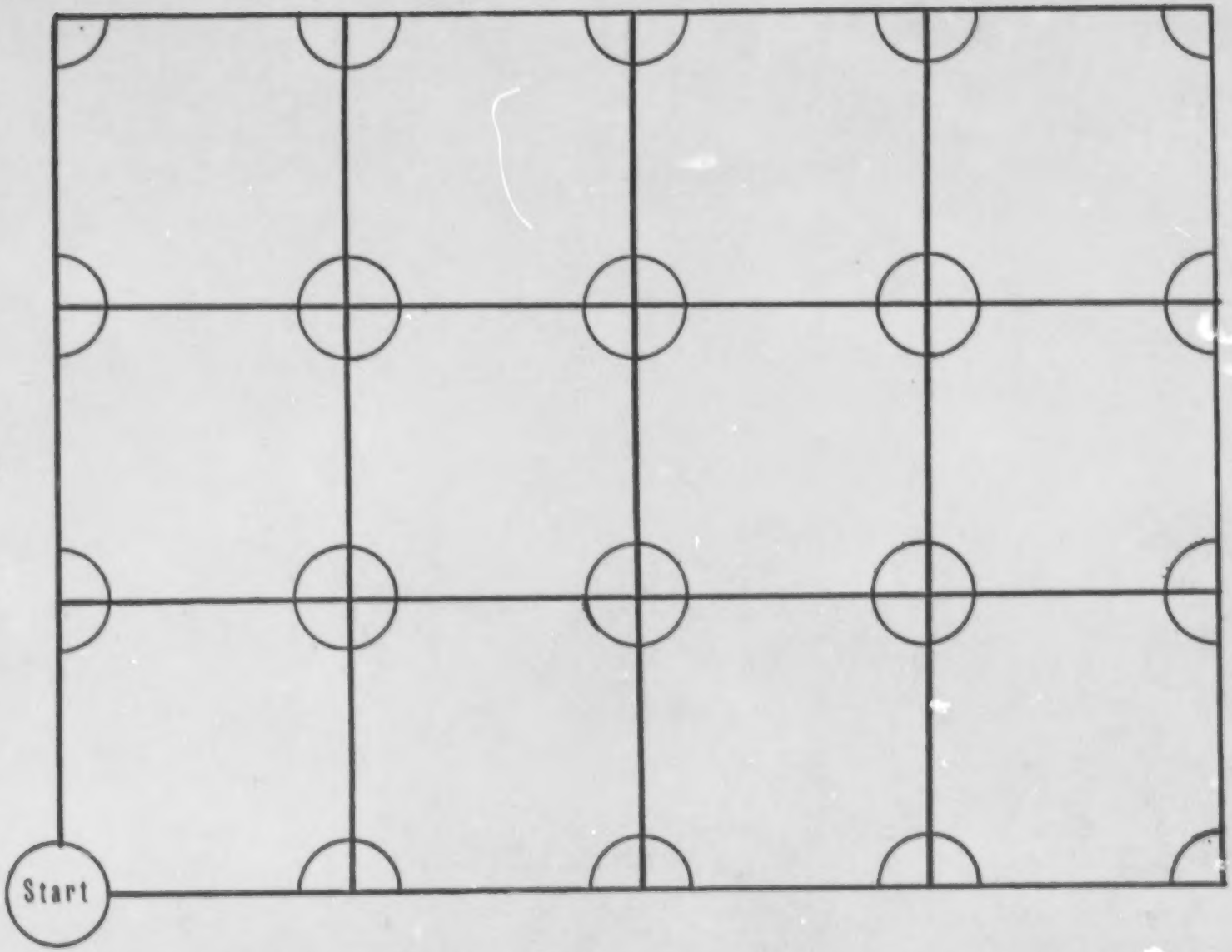
Pre-Computer: Give the following instructions to the students:

1. Get a partner. Shuffle the deck of cards and leave it face down on the table. Choose a marker.

2. Decide who goes first. The first to go picks a card off the top of the deck and beginning at Start, moves his/her round marker as instructed by the card.

3. An instruction to turn means only to spin the marker in the direction indicated. Moves can occur only on FORWARD 1 instruction. The first person to get off the board loses! The winner plays against the winner of the other game.

TURTLE TURNS



# INTRODUCING COORDINATES

Grades: 1-3

Performance Expectations: 1.5.1 Seeks work/play with computer

Curriculum Area: Mathematics

Prerequisites: None

Materials/Equipment: Transparencies Treasure Isle (page 68) and Treasure Isle Grid (page 69), water-based pen for marking transparency, and an overhead projector.

Classroom Management: Total class

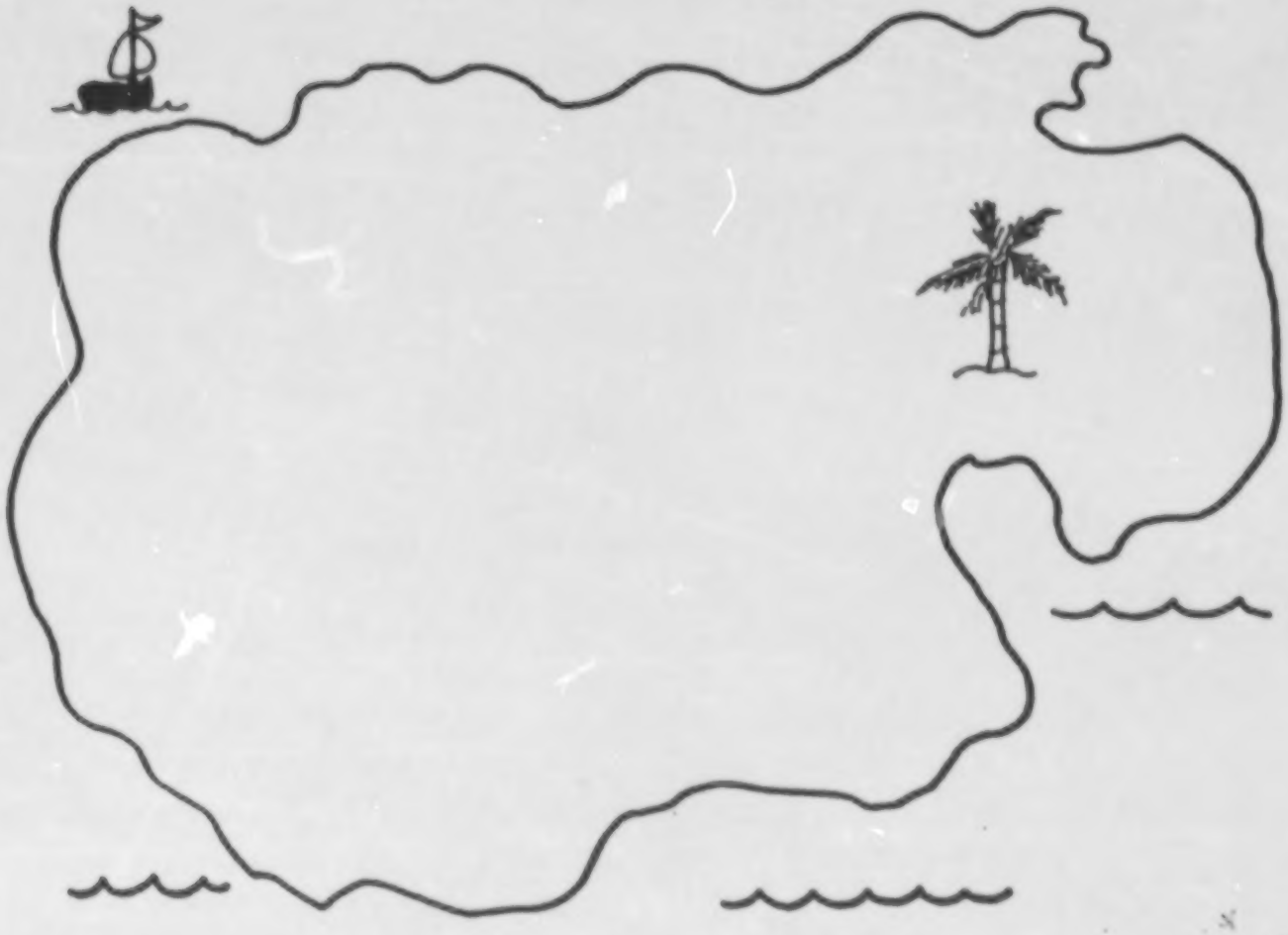
Time for Activity: One-half class period.

Teacher Preparation: Make and tape transparencies together so that Grid, (page 69) can be flipped over picture, (page 68) as an overlay.

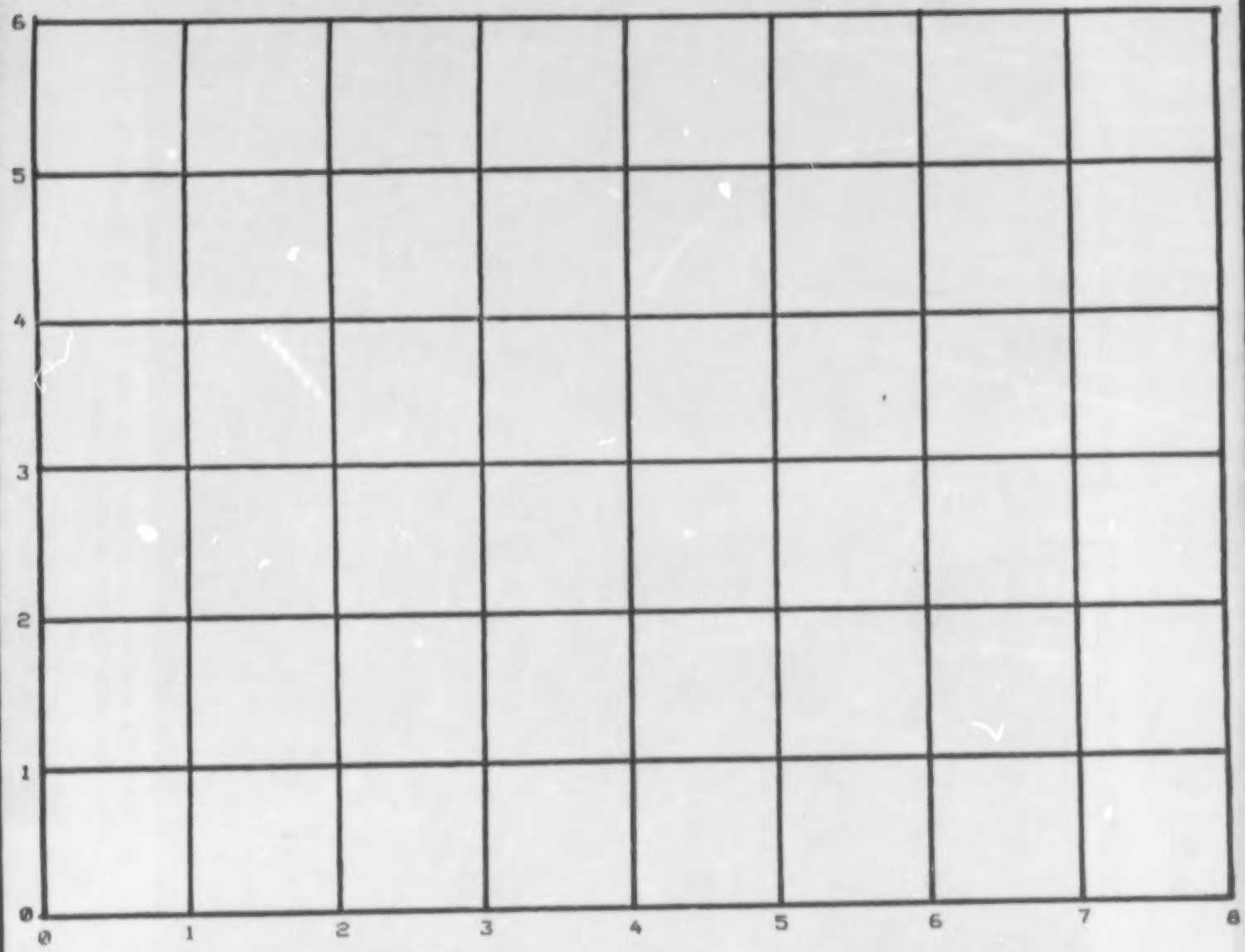
1. Use Treasure Isle transparency on the overhead. Ask the students to pretend that they are pirates and have just landed on the island to look for a good spot to bury their treasure.
2. Use the pen to mark the best spot with an "X".
3. Ask the students to brainstorm the many different ways someone might find the spot again.
4. Then use Treasure Isle Grid transparency overlay to introduce the idea of using pairs of numbers (column, row) to locate points/spots on the island.
5. Locate the coordinates of the tree, pirate ship, and whale.
6. Draw in other things on the island (crab, hut, etc.) and have students identify the coordinates of each object.

*Note: Numerical markings on grid should be changed to match coordinates to the particular graphics commands, or the SETCURSOR or SETPOS commands for your version of Logo.

TREASURE ISLAND



TREASURE ISLAND GRID



## WRAPPING AROUND

Grades: 2-3

Performance Expectations: 1.1.1 Recognizes computer instruction
1.1.2 Reads instruction, keyboard and output

Curriculum Areas: Computer Literacy, Mathematics

Prerequisites: Understands what a Logo turtle is and is familiar with HOME, FD, RT, LT, and CLEARSCREEN commands.

Materials: Chart/scratch paper, Logo disk.

Classroom Management: Partners/computer must be available.

Time for Activity: One-half class period

Teacher Preparation: Demonstrate wrapping around by winding string around a piece of cardboard. Write the instructions for step 1 in the Hands-On section on chart paper.

Hands-On: Explain the activity and give the following instructions to students:

1. A turtle step is very tiny. But when a large number of steps are taken in any one direction, the turtle goes off the screen and WRAPS around the screen like a string being wound around a piece of cardboard. Type in the following to see what happens:

```
CS
FD 200
HOME
LT 90
FD 200
```

2. Make the turtle WRAP around again and tell your teacher (or partner) how you made the turtle WRAP around.

3. How far can the turtle go straight up/to the left side/to the right side of the screen from the HOME position without WRAPPING around? Keep track of the steps as the turtle moves FORWARD (FD), RIGHT (RT), AND LEFT (LT).

# LOGO COMMANDS I

Grades: 2-3

Performance Expectations:
- 1.1.2 Reads instructions, keyoard, output
- 1.1.3 Uses control keys/commands
- 1.1.5 Experiments as a user
- 1.4.1 Recognizes programming languages

Curriculum Areas: Computer Literacy, Mathematics

Prerequisites: Experience with some Logo commands (HOME, FORWARD, BACK, RIGHT, LEFT)

Materials: Transparencies (Turtle, page 73) and (Circle, page 74) paper, Logo disk

Classroom Management: Partners/computer must be available

Time for Activity: One-half class period.

Teacher Preparation: Make transparencies of Turtle and Circle using masters on pages 73 and 74. Set up a schedule class to use computers.

Hands-On: Explain the activities to the students:

1. Place transparency of Turtle on the monitor, matching the dot with the Logo turtle. Tape it to the monitor.
2. Predict the number of turtle steps from the Logo turtle to the waiting turtle. Try to move in a straight line. Take turns with a partner (see who gets to the turtle first).

3. Log your steps on a piece of paper. Show your work to your teacher.

4. Tape transparency of Circle on the monitor, matching its center with the Logo turtle. Find the number of turtle steps from the HOME position to any point on the circle (its circumference). Move in a straight line, pen down, to watch the straight line (radius) being drawn. Write down the number of turtle steps taken.

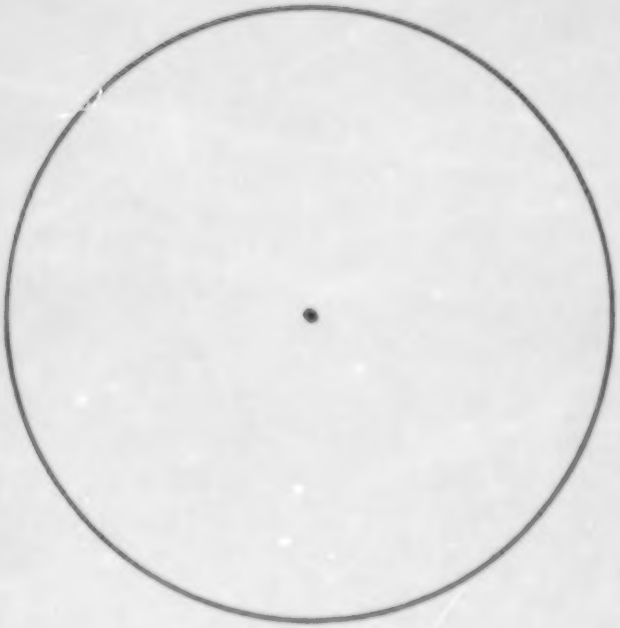
5. Send the turtle HOME.

6. Draw another radius. How many turtle steps were taken? Write down the number of turtle steps taken.

Follow-up/Enrichment: Write a short program that will make the turtle go from its HOME position up to the center top of the screen, make a right turn, go forward 20 steps, make a right turn and go forward 120 steps, make another right turn and go forward 20 steps.

TURTLE

CIRCLE



0 80

# LOGO COMMANDS II

Grades: 2-3

Performance Expectations:
1.1.2 Reads instructions, keyboard, output
1.1.3 Uses control keys/commands
1.1.5 Experiments as a user
1.4.1 Recognizes programming languages

Curriculum Areas: Computer Literacy, Mathematics

Prerequisite(s): Experience with some Logo commands.

Materials: Transparency of Maze page 76, paper, Logo disk.

Classroom Management: Partners/computer must be available.

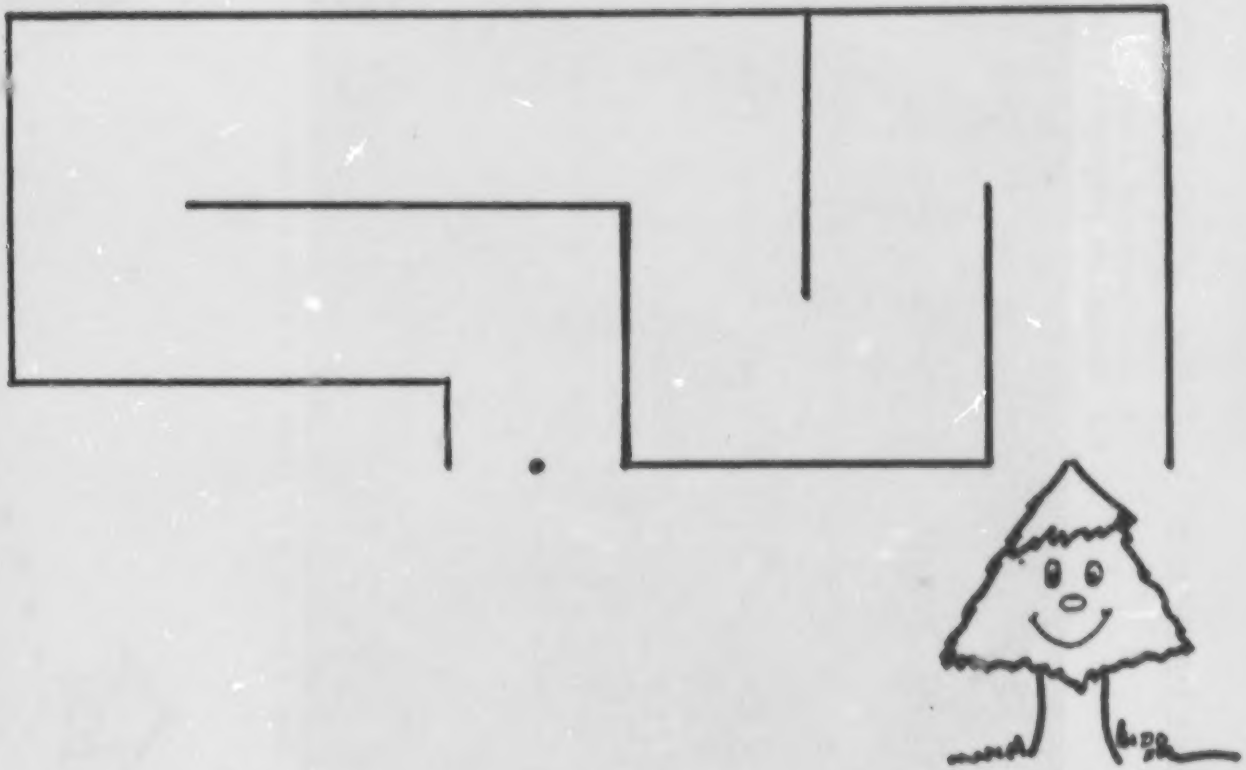
Time for Activity: One-half class period.

Teacher Preparation: Make transparency of Maze using master on page 76 and set up a schedule for its use.

Hands-On: Give the following instructions to the students:

1. Tape the transparency to the monitor matching the dot with the Logo turtle. Use Logo commands to find a way through the maze. Leave a turtle trail from the HOME position to the tree.
2. Keep track of your steps on a piece of paper.

MAZE



## PENUP AND PENDOWN COMMANDS

Grades: 2-3

Performance Expectations: 1.1.3 Uses control key/commands
1.1.5 Experiments as a user

Curriculum Areas: Computer Literacy, Mathematics

Prerequisites: Experience with Logo commands (FD, LT, and RT)

Materials: Scratch paper, transparency Turtle Trail, page 78, Logo disk

Classroom Management: Partners/computer must be available

Time for Activity: One-half class period

Teacher Preparation: Make transparency Turtle Trail using master on page 78.

Hands-on: This activity uses PENUP (PU) and PENDOWN (PD) commands alternately to fill in the line depicting a trail. Give the following instructions to the students.

1. Tape the transparency to the monitor. Place the dot over the Logo turtle.
2. Find the way to the town at the left of the screen using the PENUP command from the HOME position.
3. Complete the trail (washed out in places) so that it will lead the horse to the town at the top of the hill be using more of the PENUP and PENDOWN commands.
4. Return to the HOME position with the PENUP.
5. Record the steps on paper.

TURTLE TRAIL

78



84

## LOGO COORDINATES: DOT COMMAND

Grade: 3

Performance Expectations: 1.1.3 Uses control keys/commands

Curriculum Area: Mathematics

Prerequisites: Knows HT command in Logo and location of brackets on keyboard.

Materials: Paper to record/log steps, transparencies Night Sky page 81 and Clown page 82, Apple Logo disk.

Classroom Management: Small group/computer must be available.

Time for Activity: One-half class period

Teacher Preparation: Make transparencies of NightSky and Clown

Hands-on: Students will explore the SPLITSCREEN mode (graphics with 4 lines of text). Give the following instructions to the students:

1. The DOT command will place a dot anywhere on the screen. Be sure that the Logo turtle is at the HOME POSITION. Type HT (HIDETURTLE).
2. Then type DOT [0,0].
3. Next place a dot at the center top of the screen. (See Figure 1)
4. Place a dot between the dot in the HOME position and the dot at the center top of the screen.
5. When students have learned to place dots following the instructions in steps 2-4, one or both of the activities below may be assigned to small groups.

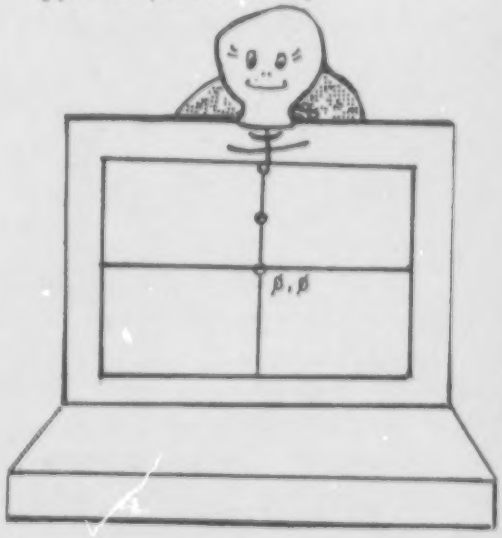
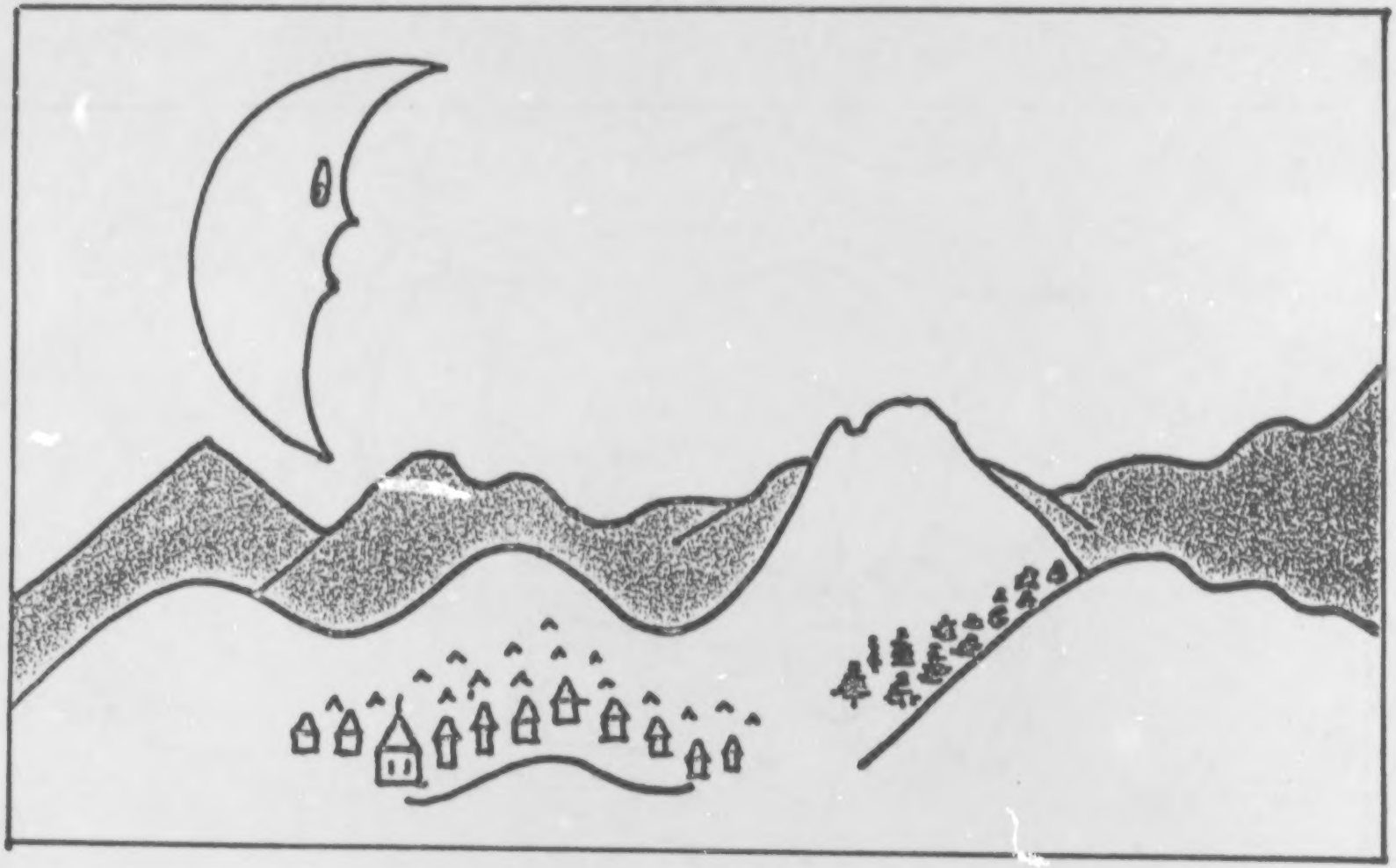



Figure 1

a. Use transparency Night Sky to place "stars" (DOTs) in the sky above the mountains and around the man in the moon.

b. Use transparency Clown to light up the clown's nose with dots.

NIGHT SKY

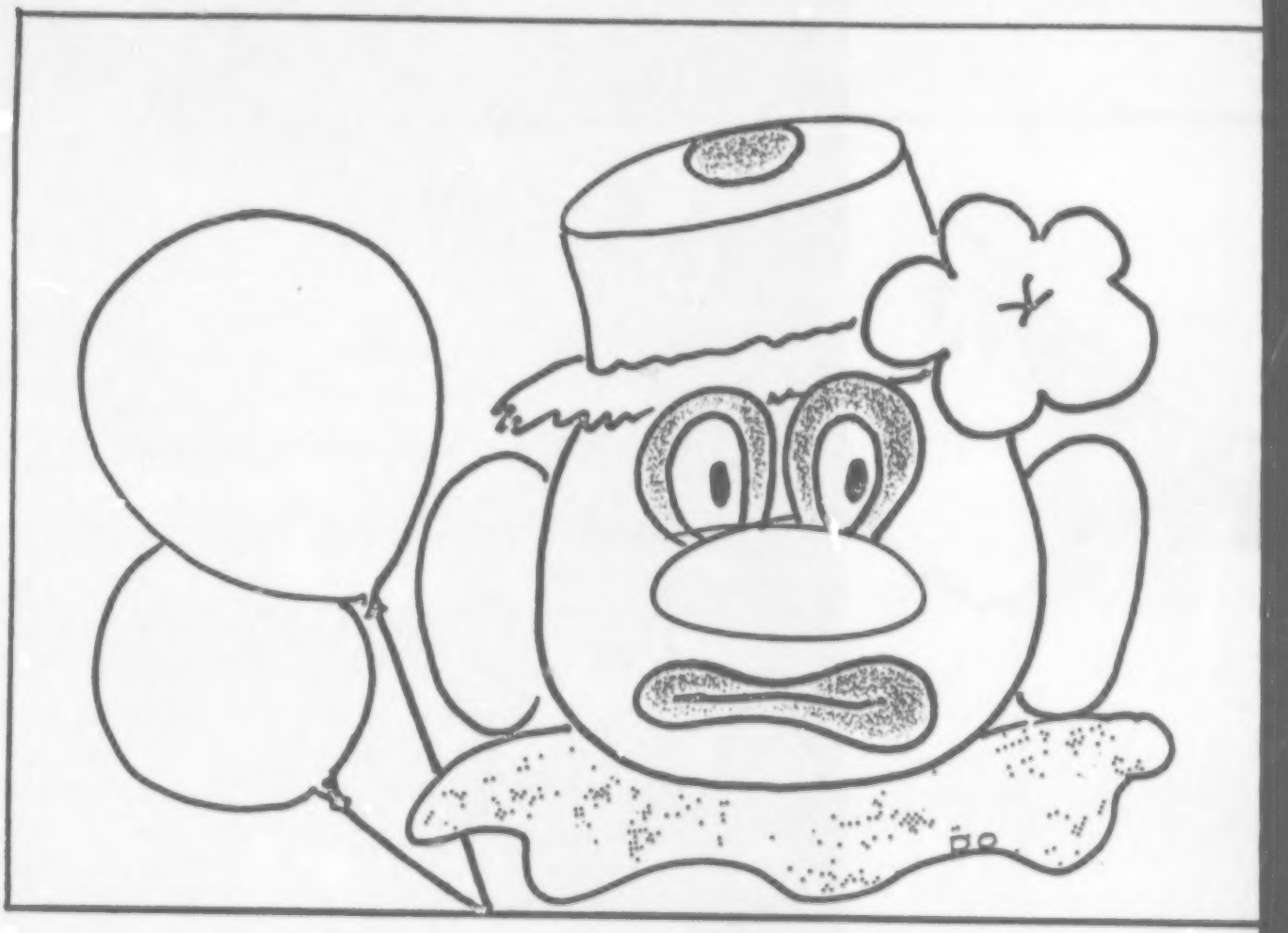


81

88

89

CLOWN



82

# DISCOVERING THE TURTLE (LOGO) LANGUAGE

Grades: 4-6

Performance Expectations: 1.4.1 Recognizes programming languages

Curriculum Area: Computer Literacy

Prerequisites:

1. This lesson is intended for students who are not familiar with Logo.
2. Students must have completed lesson on "Getting Acquainted with the Computer".
3. Teacher must be familiar with Logo software being used.

Materials: Logo software (Apple Logo, Dr. Logo, etc.) chart paper, felt pen, large classroom T.V. with RF modulator cable (optional), computer unit.

Classroom Management: Total class

Teacher Preparation:

1. (optional) Use RF modulator cable to connect computer to large classroom T.V. for optimum viewing. Test TV to make sure system is operable and image clear.
2. Put chart paper on board to list Logo commands.

Pre-Computer: Announce to class: "Today we are going to discover the computer language Logo. As we discover the commands or words which work we will list them on the chart paper so we can use them."

Hands-On: (Management - Total class viewing with small group(s) at computer(s).)

1. Load Logo. (Have a student boot Logo disk for practice.) Review the handling of disk and the start-up process.
2. When disk drive light goes off, follow the message which appears on screen. (In Apple Logo, press RETURN and "Welcome to Logo" will appear on the upper left had corner of monitor. Below the message will be a question mark followed by a square blinking cursor.) Explain that the blinking cursor expects input.

3. Tell students you want the computer to show the turtle so we can see what we are commanding. Ask students what command they think will show the turtle. As students make suggestions, have student(s) in seat 1 at keyboard type out the commands.

4. If the command is not accurate, the computer will respond with various error messages: "I don't know how to...", "Syntax error" or "Not enough input". However, keep trying several student suggestions. After several tries suggest the simple "show turtle". Error message will appear "I don't know how to turtle". Eliminate the space and type "SHOWTURTLE". Turtle will appear in the middle of the screen. Write the command on the chart paper.

5. Now have students suggest how we can get the turtle to move forward. (Turtle will not move forward with just "forward", it will need the number of steps.) Discuss with students why turtle will not move forward, what direction might be missing. The turtle knows which direction but doesn't know how many steps to take. Have students do "forward 50" and see what happens.

6. Continue with discovery of back __, right __, left __, but watch the time. Record all commands which work on chart paper.

7. Students will begin to realize with teacher's cueing that the turtle language or any computer language is precise. Put on the chart those commands which will help students to make simple shapes.

8. Rotate students and have different ones experiment with the turtle.

Follow-up/Enrichment:

1. Introduce additional activities from Scott Foresman, Logo Cards Activities; Teaching and Computers, "Logo Notebook" section each month; and/or exercises from Logo software manual.

2. Have students work out simple pictures. For shapes such as circles or arcs have students turn to manual to learn how to execute them. (See activity, "Logo--The Print Command and How to Use the Manual" pp. 87-89.)

# TELLING THE TURTLE WHAT TO DO
## (Simple Logo Programming)

Grades: 4-6

Performance Expectations:
- 1.1.1 Recognizes computer instruction
- 1.1.2 Reads instructions, keyboard, and output
- 1.1.3 Uses control keys/commands
- 1.4.1 Recognizes programming languages
- 1.4.2 Operates with words/symbols

Curriculum Areas: Mathematics, Computer Literacy

Prerequisites: Students know simple Logo commands: forward __, back __, right __, left __, clearscreen, hide turtle.

Materials: Logo disk (Apple Logo, Dr. Logo, etc.), pencil, graph paper (optional) or notebook, chart with Logo commands (already learned).

Classroom Management: Small group hands-on, large group off-computer activities

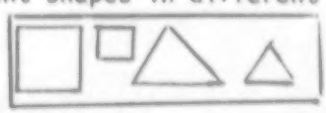
Time for Activity: Several class periods (depending on number of computers available

Teacher Preparation:

1. Prepare for several off-computer activities related to Logo programming, geometry or review of completed lessons.
2. Set criteria on how teams will be scheduled for hands-on.
3. Prepare worksheets if these are needed. (See Pre-Computer Activities in this Logo unit).

Pre-Computer:

1. Assign teams to draw a simple geometric design using at least two different shapes in different sizes. Example:



2. Have teams plan how they will move the turtle to make the designs on the computer. Have them write steps on graph paper with the design or in their notebooks.

3. Check team plans but do not correct them. Schedule teams to go on the computer.

4. Tell students if designs do not turn out as expected, they should try to make corrections. The new or corrected steps should be written down on their papers.

5. Teams must decide who will be in seat 1, seat 2, seat 3 and whether or not they will rotate.

Hands-On:

1. Have teams assigned to computers to begin. Be sure to remind them of time limits.

2. Off-computer activities can begin with teams first working on their designs and writing the Logo programs.

Follow-up/Enrichment:

1. Those groups that could not complete their design should meet and try to "debug" (discover what went wrong and correct) their procedures. This is an important aspect of Logo's problem-solving features. Teacher can look over students' notebooks to find out if there are common errors which can be pointed out to the entire class in a lesson.

2. Teams which were successful in their first attempt can begin making more challenging designs and programs. (Teach how to write procedures into new commands, "TO...").

3. Add to the chart any new commands students need to "debug".

4. Suggest that students share designs and have others write procedures for them. Compare the procedures to see which one is more efficient (takes less steps).

5. Have two teams work together on a city, village, garden, etc. using what they know. (Save these on blank disks so students will not have to start at the beginning each time.)

6. Try other Logo activities included in this unit. Some of the K-3 activities may be appropriate for upper elementary students who have had with little or no experience using Logo.

# LOGO - THE PRINT COMMAND AND HOW TO USE A MANUAL

Grades: 4-6

Performance Expectations:
- 1.1.1 Recognizes computer instructions
- 1.1.2 Reads instructions, keyboard, output
- 1.1.3 Uses control keys/commands
- 1.1.4 Selects/uses written resources

Curriculum Areas: Language Arts, Computer Literacy

Prerequisites: Students have completed the lesson, Telling the Turtle What to Do, pp. 85-86.

Materials: Manual(s) which come with your Logo program; Logo disks, chart paper, overhead transparencies of "Table of Contents" and pages on "Print Command" (optional), overhead projector.

Classroom Management: Total Class

Teacher Preparation:

1. Go through manual to become familiar with its format and identify those sections you feel are important to its use. Example: Table of Contents, Index, etc.
2. Set up computer unit(s) for demonstration hands-on.
3. Set up overhead projector.
4. Prepare transparencies.

Pre-Computer: Begin by asking: "What else can we do with Logo besides having the turtle draw pictures and shapes? Let's find out by looking in the manual which comes with the program."

1. Discuss what a manual is in general. (Book which explains how product works.) Ask students where and what kind of manuals they have seen. (Kits, games, carbooks, teachers' manuals, appliance, etc.)
2. Explain that Logo has several manuals but today they will study how to use one in order to make better use of the computer and the Logo program.

3. Hold up manual, "In any kind of book where do we look if we want to know what's in it?" (Table of Contents, Index, headings, etc.) Discuss the difference between Table of Contents and Index and where each would be located in a book.

4. Turn to Table of Contents in the manual, place overhead transparency of Content on projector. Read the contents as written. Ask, "If I wanted to write words rather than draw pictures which chapter might I turn to?"

5. Turn to the pages students suggest and read. If correct proceed. If not correct continue until the correct chapter or page is found. Place overhead transparency of Print Command on projector so students can see what manual says.

Hands-On:

1. Have student(s) in Seat 1 type commands as you read the page out loud. Have class see what is happening on the monitor. (At this point you may have to introduce ← (left arrow) key to make corrections for typographical errors.

2. Review with students the print command and the arrow for corrections.

3. Experiment by suggesting to student in Seat 1 to try the following:
   a. Type "Print no-space bracket space word end bracket and return". (Do not type in the quotation marks). What happened?
   b. Type "Print space bracket space word space end bracket return". (Do not type in the quotation marks). What happened? (Generally, spaces or no spaces make little difference in Apple Logo. The print command will be executed.)

4. Review location of [ ] on keyboard or what letters make brackets. Also review the use of ← key.

5. Now go to the Index and see how to locate Print Command. (With Apple Logo the command word must be known in order to locate the pages where the information can be found. For example, you would not look under "writing titles for pictures" or "words". You will need to see "print".)

6. If other manuals are available these can be brought to students attention. Encourage students to explore these manuals and to use them to solve problems that are encountered.

Follow-up/Enrichment:

1. Have student write titles under pictures they have executed on the computer. The SETCURSOR command will allow students to center or place the print anywhere on the screen.

2. Have students experiment with printing names, addresses, phone number, school, etc. Save on disk and print out later for class a directory.

3. This lesson may be adapted for using the DOS manual and DOS system disk for a lesson in BASIC.

# TURTLE TURNS I

Grades: 4-6

Performance Expectations: 1.1.3 Uses control keys/commands.

Curriculum Area: Mathematics

Prerequisites: Knows result of RIGHT and LEFT turn commands (such as the difference between RT 45 and RT 90)

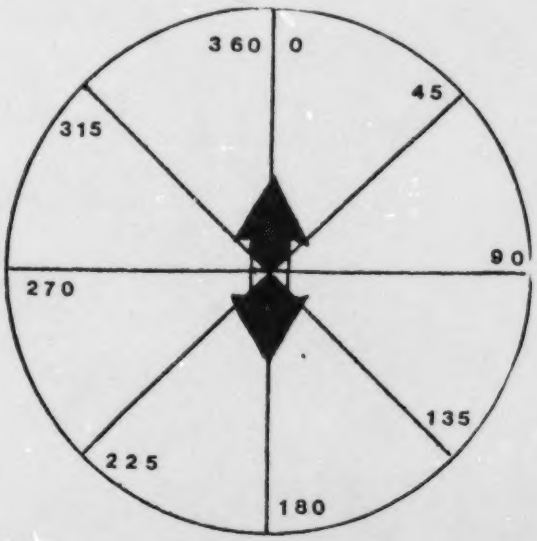
Materials: Paper plate, cardboard, paper fastener, felt pen for each child

Time for Activity: One-half class period

Teacher Preparation: Have materials on hand

Pre-Computer: Give the following instructions to the students to make a computer "compass" to help in programming turtle turns:

1. Mark off the paper plate into eight equal parts.
2. Cut out two "hands" (use one to mark your original position) and fasten them to the center of the plate with a fastener.
3. Label the intervals as follows:



4. Discuss questions such as:

   a. How many degrees must a turtle turn in order to make a complete circle? A half circle?
   b. What other turns (or combinations of turns) are "the same as" (end in the same position) as RT 180?

Follow-up/Enrichment:

1. Write short programs in Logo that can make the turtle spin completely around until it is back in its original position. Write them using 4 commands/2 commands/1 command. Compare and discuss students responses. Are there any patterns? What conclusions can be made?

2. Predict in what direction the turtle will be facing in this short program:

```
CS
LT 20
LT 35
LT 50
LT 75
```

# TURTLE TURNS II

Grades: 4-6

Performance Expectations: 1.1.3 Uses control keys/commands
1.1.5 Experiments as a user

Curriculum Area: Mathematics

Prerequisites: Knows result of RIGHT and LEFT turn commands (such as the difference between RT 45 and RT 90)

Materials: Computer compass (from Turtle Turns I pp. 90-9i), Logo disk

Classroom Management: Small group/computer must be available

Time for Activity: One-half class period

Teacher Preparation: None

Hands-On: Give the following instructions to the students:

1. Type the following commands and watch the turtle turn:

   SETH 360

   SETH 225

   SETH 180

   SETH 0

   SETH 90

   SETH 270

2. Complete the following to make a square:

   SETH 0

   FD 75

3. Use SETH commands to draw an equilateral triangle.

# TURTLE TURNS III

Grades: 4-6

Performance Expectations: 1.4.2 Operates with words and symbols

Curriculum Areas: Mathematics

Prerequisites: Understands the use of degrees to program turtle turns.

Materials: Clock transparency page 95, paper, Logo disk

Classroom Management: Small group/computer must be available

Time for Activity: One-half class period

Teacher Preparation: Make transparency of Clock using master on page 95.

Hands-On: Give the following instructions to the students:

1. Place the clock transparency on the monitor with the center of the clock,over the Logo turtle in its HOME position. Tape it to the monitor.
2. Use Logo commands (HT, ST, RT, LT, FD, BK) to experiment, record/log, and write a short program to show the following times on the clock:

3 o'clock

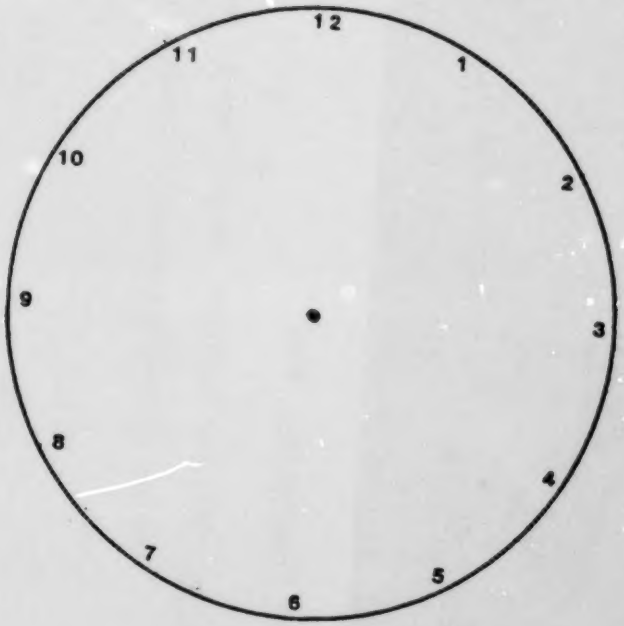
6 o'clock

Follow-up/Enrichment:

1. Add arrows (triangles) at the tips of the hour and minute hands.
2. Predict the time with this program:

```
CS
FD 60
HT
HOME
ST
RT 235
FD 40
HOME
END
```

CLOCK



# EDIT CONTROL KEYS

Grades: 4-6

Performance Expectations: 1.1.3 Uses control keys/commands

Curriculum Area: Computer Literacy

Prerequisites: Experience writing Logo procedures

Materials: Apple Logo disk
Note: The edit procedures differ with every version of Logo. These procedures can be adapted for other versions of Logo. Refer to your Logo manual for editing procedures.

Classroom Management: Partners/computer must be available

Time for Activity: One-half class period

Teacher Preparation: None

Hands-On: Give the following instructions to the students:

1. Type the following procedure to make a box. Then run it.

```
TO BOX
FD 40
RT 90
FD 60
LT 90
FT 40
RT 90
FD 6
END
```

2. To make corrections to debug the procedure, type ED "BOX or EDIT "BOX. You will see LOGO EDITOR in a band at the bottom of the screen.

3. Use the following control keys to move the cursor around:

   Control C

   Control D

   Control N

   Control P

4. Record or log what these control keys do to help make corrections.

5. Continue to debug the procedure until it can design a BOX on the screen.

# LOGO PROGRAMMING I

Grade: 4-6

Performance Expectations: 1.1.5 Experiments as a user

Curriculum Area: Mathematics

Prerequisites: Knows how to write procedures

Materials: Blackboard, paper, Logo disk

Classroom Management: Total class/computer must be available.

Time for Activity: One-half class period

Teacher Preparation: None

Hands-On: Give the following instructions to the students:

1. Predict what figure this program will produce on the screen:

```
CS
HT
FD 50
RT 90
FD 100
RT 90
FD 50
```

2. Run it and give the figure a name.
3. Write a procedure that will draw a figure that is half that size.
4. Write a procedure that will draw the same figure (as in step #3) 10 turtle steps to the left of the first.

# LOGO COORDINATES: STAIRCASE

Grades: 4-6

Performance Expectations: 1.1.3 Uses control keys/commands

Curriculum Areas: Computer Literacy, Mathematics

Prerequisites: Some experience with DOT command (See pp. 79-82)

Materials: Paper, transparency Grid, copies of Grid for students, Logo disk

Classroom Management: Total class

Time for Activity: One-half class period

Teacher Preparation: Make transparency for the overhead and student copies of Grid using master p. 101.

Pre-Computer: Give the following instructions to the students:

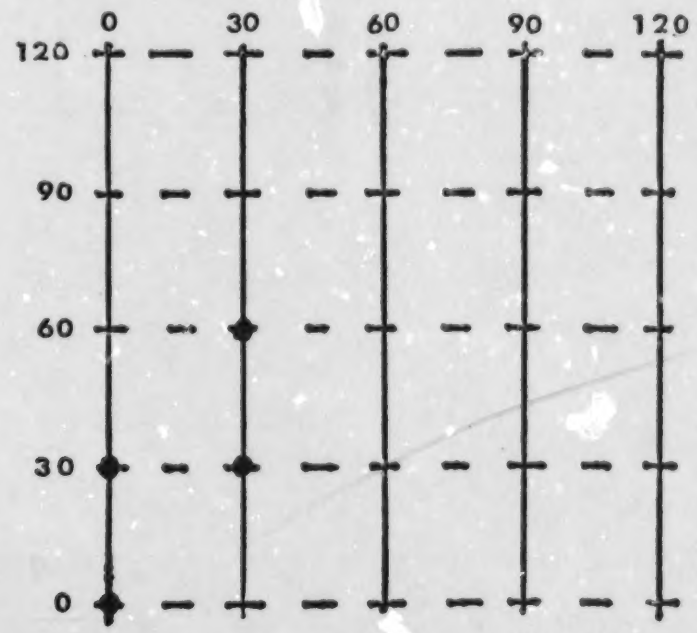
1. Locate the following coordinates on the grid:

0 0

0 30

30 30

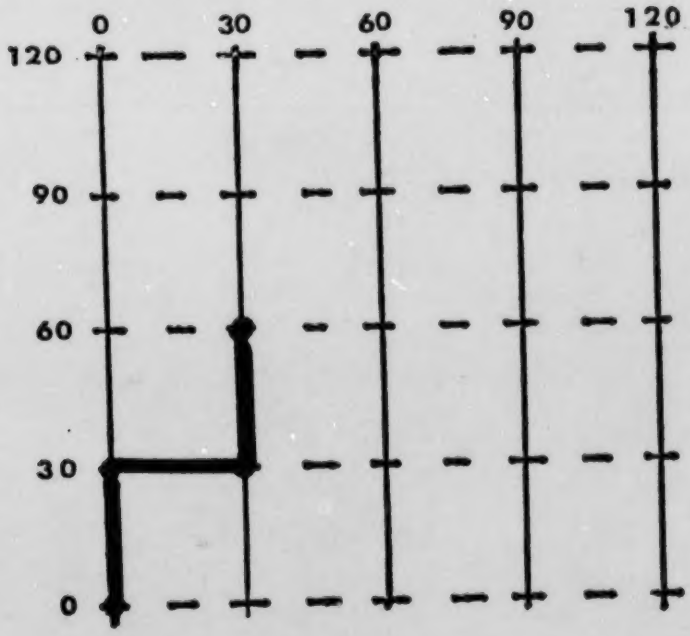
30 60



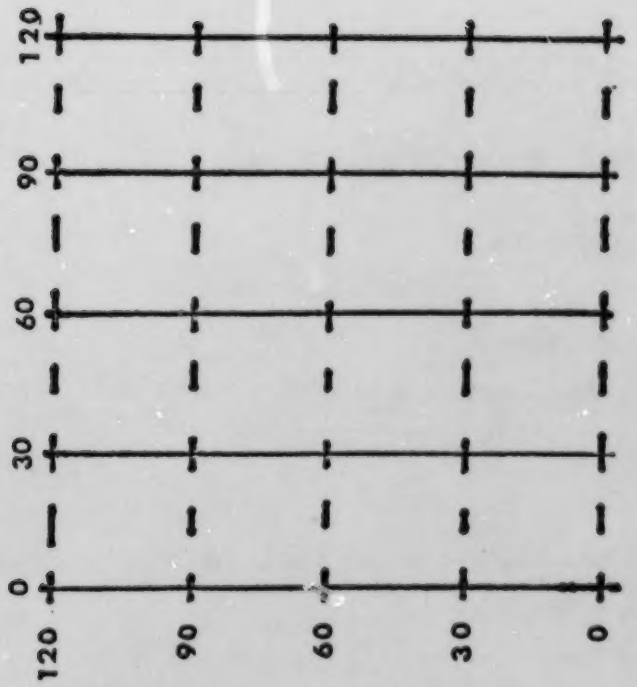
2. Continue to locate the coordinates that will design a staircase leading to the upper right corner.

3. Use DOT commands to write a short program that will replicate the dot design on the computer.

4. SETPOS commands using the same coordinates will connect the dots with lines. Add a SETPOS program to the DOT program to design a staircase that goes from the center of the screen to the upper right corner of the screen.



GRID



# LOGO PROGRAMMING II

Grades: 4-6

Performance Expectations: 1.4.2 Operates with words/symbols

Curriculum Area: Computer Literacy

Prerequisites: Experience writing Logo procedures

Materials: Blackboard/paper, Logo disk

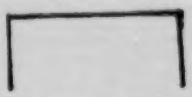
Classroom Management: Total class

Time for Activity: One-half class period

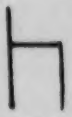
Teacher Preparation: None

Pre-Computer: Give the following instructions to the students:

1. Write a short procedure that will design the following figure:



2. Write a short procedure that will add the following figure to the left of the first design.



3. Write a short procedure that will add the following figure to the design above:

4. Combine the three procedures and give it a NAME:

```
TO _____________________
CS
(Name of procedure #1)
PU
HOME
PD
(Name of procedure #2)
PU
HOME
PD
PD
(Name of procedure #3)
END
```

5. Why were the HOME, PU, and PD commands included? What do you think would appear on the screen if you just entered the three procedures without the HOME, PU, and PD commands? Try it and see.

# RECURSION

Grades: 4-6

Performance Expectations: 1.1.3 Uses control keys/commands

Curriculum Area: Computer Literacy

Prerequisites: Experience writing Logo procedures

Materials: Blackboard/paper, Logo disk, and disk for demonstrating BASIC loop

Classroom Management: Total class/computer must be available

Time for Activity: One-half class period

Teacher Preparation: (Optional) Flowchart and demonstration program in BASIC that will loop and RUN continuously until stopped:

```
10  PRINT "AND THE BEAT GOES ON";
20  PRINT "AND ON",
30  GOTO 20
40  END
```

Hands-On: Explain the following activity to the students:

1. Write a procedure in Logo using recursion (a procedure within a procedure with the same name (e.g. CIRCLE within a procedure called CIRCLE). Recursion will cause the procedure to run continuously until stopped by the user.

2. *In Apple Logo:

   Control W will stop the program temporarily until any key is tapped.

   Control Z will stop the program temporarily until CO is typed to COntinue.

   Control G will stop the program.

*see note next page

3. Write a procedure to design a five pointed star:

| | |
|---|---|
| What is the name of this procedure? | _____ |
| How many times will the FORWARD steps and RIGHT turns be REPEATed? | REPEAT __[FD 50 RT 144] |
| Erase (CLEAN) the screen | _____ |
| What name do we type to make this procedure run continuously? | _____ |
| What word should be placed here even though the program will not stop until you tap the control keys? | _____ |

4. Enter the program on the computer and let it run a while before trying the control keys.

5. Ask a student at the blackboard to simulate the execution of the step by step instructions to place and erase the five pointed star on the screen.

6. Discuss how recursion directs/controls the flow of steps in a procedure.

7. (Optional) Describe the difference between an infinite loop (resulting from a BASIC GOTO statement) and recursion.

*Note: Refer to the manual accompanying your Logo program for instructions on stopping a recursive procedure.

# LOGO ANIMATION

Grade: 6

Performance Expectations: 2.1.2 Creates program from flowchart

Curriculum Area: Computer Literacy

Prerequisites: Experience writing simple Logo procedures

Materials: Blackboard, Logo disk

Classroom Management: Total class

Time for Activity: One-half to one class period

Teacher Preparation: Define animation (simulating movement)

Pre-Computer: Give the following instructions to the students to write a program in Logo that simulates movement by drawing, erasing and drawing.

1. Type the procedure below to design a small circle:

```
TO CIRCLE

REPEAT 72 [RT 5 FD 1]
END
```

2. Write/Type the procedure below which will make the circle move from the HOME position to the right of the screen.

Name the procedure that you want to MOVE. _____

Clear the screen. _____

Hide the turtle. ___

* How many times is the CIRCLE going to MOVE? REPEAT ___

* Write the name of the original procedure [_____

* Then put the PENUP ___

* CLEAN the screen (CLEAN erases the screen completely _____

* Turn the turtle 90 degrees to the right _____

* Go forward 28 steps _____

* Turn the turtle 90 degrees to the left _____

* Put the PENDOWN _____]

END the procedure _____

3. Write the circle animation procedure using four program lines. Place all the steps marked with an asterisk (*) on one program line.

4. Would it be possible to make the circle move across the screen, WRAP around, appear at the left side, and go across the screen again?

# VARIABLES

Grade: 6

Performance Expectations: 2.1.2 Creates a program from a flowchart

Curriculum Areas: Computer Literacy, Mathematics

Prerequisite: Experience using LET statements in BASIC

Materials: Blackboard/paper

Classroom Management: Total class

Time for Activity: One-half class period

Teacher Preparation: Review the use of LET statements to store variable names and their assigned values in memory locations in the computer. Review the procedure to draw a SQUARE in Logo.

Pre-Computer: Work through the following activity with the students:

1. The variable in this Logo procedure is that name which is preceded by the name of the procedure followed by a colon. The value given the variable name can be changed to vary the length of the sides of the SQUARE.

2. Follow the steps to write a procedure in Logo that will design a SQUARE whose SIDEs can be changed:

| | |
|---|---|
| Write the name of the procedure followed by a space, a colon, and the variable name (what name will you give it?) | (procedure name) :(variable name) |
| Type the command to REPEAT 4 times followed by a bracket, FD, a space, a colon, the variable name, the command to turn (RT or LT) to form a right angle, and a bracket. | _____ :_____ |
| END the procedure. | ___ |

Type the name of the procedure followed by a space and a number (length of a SIDE). (procedure name) : (number)

3. What value would increase the size of the square so that its sides would be twice as long as the original sides? One-half as long as the original sides? Run the program using these values.

4. Describe the effect on the area of the squares when the sides are doubled; decreased by one-half. How many smaller squares can you fit into the larger one?

5. Describe what is meant by a variable.

6. Compare the similarities and differences between the use of variables in Logo and BASIC.

# LOGO COMMANDS

Grade: 6

Performance Expectations: 1.4.2 Operates with words/symbols

Curriculum Area: Computer Literacy

Prerequisites: Experience with writing Logo procedures

Materials: Chart paper, Logo disk

Classroom Management: Total class

Time for Activity: One-half to one class period

Teacher Preparation: Write instructions found on next page on a chart or overhead transparency. *LEAVE OUT THOSE INSTRUCTIONS MARKED WITH ASTERISKS*.

```
TO CIRCLE
REPEAT 90 [RT 4 FD 1]
END
TO CIRCLES
PU
FD 30
LT 90
FD 50
RT 90
PD
CIRCLE
PU
RT 90
FD 35
LT 90
PD
CIRCLE
PU
RT 90
FD 35
LT 90
PD
CIRCLE
PU
BK 12
LT 90
FD 17
RT 90
PD
CIRCLE
* PU
* LT 90
* FD 35
* RT 90
* PD
* CIRCLE
* HT
* PR [TERRIFIC!
      YOU'RE A
      WINNER TOO!]
* END
```

Pre-Computer:

1. Ask students to read the instructions on the chart and draw the design on scratch paper. Compare/share their designs.

2. Run the program on the computer. (Type END after the fourth CIRCLE procedure; i.e., before the asterisks begin.)

3. Ask the students to write the instructions that will complete the program.

Hands-On:

1. Run the complete program. (Remove the END command after the fourth CIRCLE procedure with CONTROL K (Apple IIe). See Edit Control Keys activity, pp. 96-97, for editing procedures.

# LOGO MUSIC

Grades: 4-6

Performance Expectations:
1.1.3 Uses control keys/commands
1.1.5 Experiments as a user
1.4.1 Recognizes programming languages
1.4.2 Operates with words/symbols
3.2.1 Identifies applications

Curriculum Area: Music, Mathematics

Prerequisite: The children should have been introduced to Logo and have some experience in reading simple music.

Materials: Terrapin Logo Language Disk, Terrapin Logo Utilities Disk, worksheet (or plain paper),and pencil. Note: These lessons were developed for use with Terrapin Logo.) Consult your manual for slight variations in your Logo program for generating music.

Classroom Management: For Pre-Computer activities you may teach the total class, followed by work in pairs or individually.

Time for Activity: One class period per activity; however, you may be able to cover 1 to 3 activities in a period, depending on the progress of the students.

Pre-Computer Activities: The first three activities are an introduction to pitch (notes), duration, and the use and function of control keys.

Activity 1 - Notable Numbers: Assigning numbers to notes
Activity 2 - Durable Numbers: Assigning numbers to duration
Activity 3 - Play, Rest & Proceed: Play, rests, and subprocedures and procedures

To save time, you may want to make transparencies of the information sheets on loading Logo and how to make music with Logo. This information may also be written on chart paper, oaktag or on the chalkboard.

Hands-On Activities: The next four activities require putting information together, using subprocedures and applying skills to more challenging compositions. These activities are:

Activity 4 - Play it again, Sam! and Fillings!!
5 - Octaves and a Flattened b
6 - Sharpened F by the light of the moon
7 - Beat - the - Oven!

Follow-up and enrichment activities are marked "EXTRA".

## NOTES AND THEIR CORRESPONDING NUMBERS

| Treble Clef | Bass Clef |
|---|---|
| F-25 | B-7 |
| E-24 | A-5 |
| D-22 | G-3 |
| C-20(high C) | F-1 |
| B-19 | |
| A-17 | |
| G-15 | |
| F-13 | |
| E-12 | |
| D-10 | |
| C-8 | |

### DURATION
(Values of Notes)

| | | | | |
|---|---|---|---|---|
| | Eighth Note | 20 | | Dotted Eighth Note 30 |
| | Quarter Note | 40 | | Dotted Quarter Note 60 |
| | Half Note | 80 | | Dotted Half Note 120 |
| | Whole Note | 160 | | |

### RESTS

| | | |
|---|---|---|
| | Eighth Rest | 20 |
| | Quarter Rest | 40 |
| | Half Rest | 80 |

LOGO MUSIC ACTIVITY 1
Notable Numbers

## Assigning Numbers to Notes

We will review notes on the treble clef and assign numbers to those notes. Refer to the information sheet as you do this.

1. Using Logo, let's practice programming a familiar song, Twinkle, Twinkle Little Star. Refer to the notechart and place the correct number above the corresponding note. Line 1 has been done for you!

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | 8 | 15 | 15 | 17 | 17 | 15 |
| C | C | G | G | A | A | G |
| F | F | E | E | D | D | C |
| G | G | F | F | E | E | D |
| G | G | F | F | E | E | D |
| C | C | G | G | A | A | G |
| F | F | E | E | D | D | C |

2. Which lines are similar to each other?

Line 1 and line ____
Line 2 and line ____
Line 3 and line ____

3. Now, practice assigning numbers to Mary Had a Little Lamb.

| | | | | | | |
|---|---|---|---|---|---|---|
| E | D | C | D | E | E | E |
| D | D | D | E | G | G | |
| E | D | C | D | E | E | E |
| E | D | D | E | D | C | |

4. Did you find any lines repeated? If so, which ones?

5. We now add a high-C. Note the number corresponding to high-C. This is the tune, Three Blind Mice.

E D C E D C

G F F E G F F E

G hi-C hi-C B A B hi-C G G

G hi-C hi-C hi-C B A B hi-C G G

G G hi-C hi-C B A B hi-C G G G

F E D C

6. Now, you will be given numbers. Can you write the corresponding letters to the tune of Row, Row, Row Your Boat?

8 8 8 10 12

12 10 12 13 15

20 20 20 15 15 15 12 12 12 8 8 8

15 13 12 10 8

7. Save this sheet. It will facilitate doing future lessons!

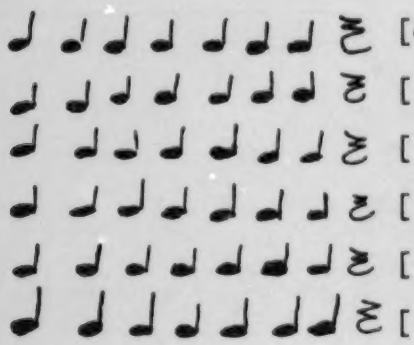
8. EXTRA. Ask your teacher or music specialist for some songs to program in Logo. Take the music and convert it to numbers as you have done in this lesson.

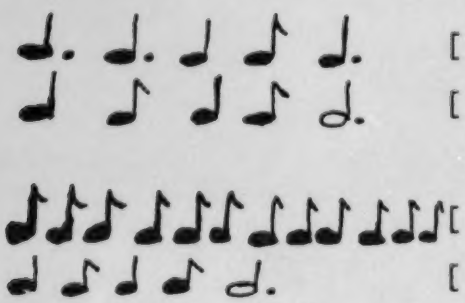
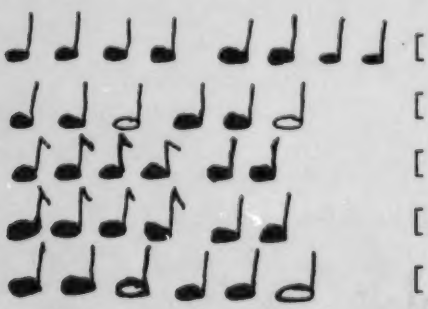
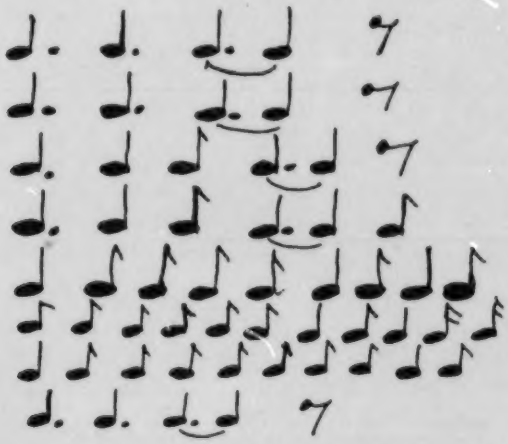
LOGO MUSIC ACTIVITY 2

Durable Numbers

We will go into the value of notes, which is called timing, or DURATION.

1. Refer to the chart on notes and write the DURATION in the BRACKETS provided to the right of each set of notes of Twinkle, Twinkle Little Star. Line one has been done for you. Note the quarter rest at the end of each line.




2. Write the DURATION to Row, Row, Row Your Boat. Note that we have dotted quarter notes, eighth notes and dotted half notes.

3. Write durations in the brackets for Fre're Jacques.

4. For Three Blind Mice, dotted quarter notes are involved. Dotted quarter notes have a count of 60. Also ♩. ♩ means that the notes are a "tie" so the total count is 60+40 or 100. We encounter "𝄾 " which is eighth rest, with a count of 20. Line 1 has been done for you! Also 𝅘𝅥𝅯 has half the count of ♪ .

[ 60 60 100 20 ]
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

5. EXTRA. Gather other songs and write the duration to their notes.

LOGO MUSIC ACTIVITY 3

Play, Rest and Proceed

Here, we put together our notes, duration and add the command PLAY. When you type in the command PLAY with the notes and duration in brackets as shown below, the computer will play that tune for you.

If you do not have brackets '[' and ']' you may need to use Shift N for '[' and Shift M for ']'.

Rests are denoted by R. For this activity all quarter notes and quarter rests are used, so the value of R is also 40.

1. For Twinkle, Twinkle Little Star, note how the song is put together...Note that the letter R is used to denote a rest. Note that the rests may have different values too.

```
PLAY [8  8  15  15 17 17 15  R] [40  40  40  40  40  40  40  40]
PLAY [13  13  12  12  10  10  8  R]  [40 40 40 40 40 40 40 40]
PLAY [15  15  13  13  12  12  10  R]  [40 40 40 40 40 40 40 40]
PLAY [15  15  13  13  12  12  10  R]  [40 40 40 40 40 40 40 40]
PLAY [8  8  15  15  17  17  15  R]  [40 40 40 40 40 40 40 40]
PLAY [13  13  12  12  10 10 8 R] [40  40  40  40  40  40  40  40]
```

   Subprocedures. We will break the song into smaller parts (T1, T2 and T3) and then combine all of them and call it TWINKLE. It is wise to check out each line and correct mistakes in them rather than write a whole procedure only to find errors and then have to correct them.

   Control-C (CTRL-C) defines the subprocedure. Note: CTRL-C means hold down the CONTROL KEY while you press the letter C.

2. Note that since lines 1 and 5 are the same, as are lines 2 & 6, lines 3 & 4, we will not have to write all of them out. Instead we can define lines into smaller sub-procedures and give them any name that we wish. We will do that now.

   We get into the EDIT mode by using the word "TO" followed by the name of the sub-procedure that we wish to use. Let's call it T1 (for Twinkle.1) or whatever you wish.

```
TO T1

PLAY [8  8  15  15  17  17  15  R] [40 40 40 40 40 40 40 40]

END

(CTRL-C)
```

   In the next activity, you will enter the above program and the computer will read "T1 defined," which means it is in memory.

3. Now, it is your turn to define T2 (or the second and 6th lines).

```
TO T2
PLAY [                    ] [                    ]
END
(CTRL - C)
```

4. Do the same for T3 or lines 3 and 4.

```
_______
_______ [                 ] [                    ]
_______
(_______)
```

5. PROCEDURE:
Now, we will put the six lines of our song together and call the whole procedure, TWINKLE. To do this, we defind the procedure in the same way that we did the subprocedures.

```
TO TWINKLE
T1
T2
T3
T3
T1
T2
END
CTRL - C
```

## LOGO MUSIC ACTIVITY 4

### Play It Again, SAM!

At last, we get to the computer! Now we type in our programs.

1. Refer to the previous lesson, TWINKLE. Type in the subprocedures T1, T2 and T3; type in the procedure TWINKLE. Remember to use the correct format using 'To', 'Play', Brackets, 'END' and pressing CTRL-C. Also insert blank chart.

2. You may need certain control keys in editing your programs. It will be helpful to fill in the chart provided so that you won't have to keep referring to your manual.

3. To hear any one line, type in T1, T2 or T3. CTRL-P lets you replay the same tune again without having to type in the title again.

4. Extra: Change the duration to any line to slow down or jazz up your song.

### CONTROL KEYS

| FUNCTION | Terrapin LOGO | Apple LOGO | Other |
|---|---|---|---|
| Makes all the EDIT changes. Exits Logo, Editor. Adds procedure to memory. | CTRL - C | | |
| Deletes character under the cursor. Moves text one space to the left. | CTRL - D | | |
| Stops what the computer is doing. | CTRL - G | | |
| Erases what is under and to the right of the cursor. | CTRL - K | | |

INFORMATION SHEET FOR TERRAPIN LOGO

PROCEDURES FOR INITIALIZING A STORAGE DISK

1. Insert Utilities disk.
2. Turn on computer.
3. After red disk drive light goes off, remove the Utilities disk.
4. Insert a blank disk.
5. Type INIT HELLO.
6. Press RETURN.
7. After the red light goes off, you have a storage disk to use.

PROCEDURES FOR LOADING LOGO MUSIC.

1. Insert Language Disk.
2. Turn on computer.
3. After red disk drive light goes off, remove Language Disk.
4. Insert Utilities Disk.
5. Type READ "MUSIC.
6. Type SETUP and press RETURN.
7. After red light goes off, remove disk.
8. Insert your own storage disk to save your program.

NOTES:

1. If your computer does not have '[' and ']' you will need to use Shift N and Shift M, respectively.

2. Depending on the length of each song, you may want to use subprocedures for be easier editing in case of errors.

3. PO (Print Out) prints out your program. POTS (Print Out Titles) prints out all titles of programs which have been saved.

4. Other Commands:

   SAVE - To save a file, make sure your initialized desk is in the drive. Type SAVE "TWINKLE or whatever title you choose.

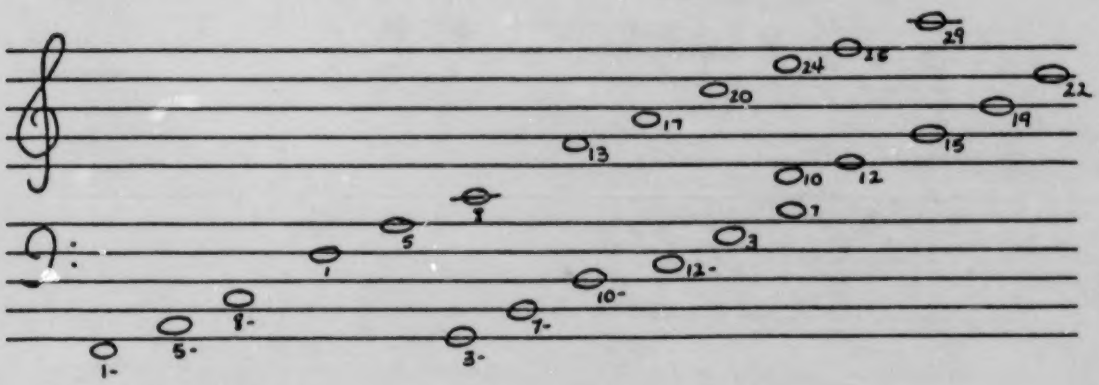
   CATALOG - Any files saved in Logo language will appear by their names, followed by .LOGO. For instance TWINKLE.LOGO.

   READ - To load a file you have saved. Type READ "TWINKLE or whatever file you choose.

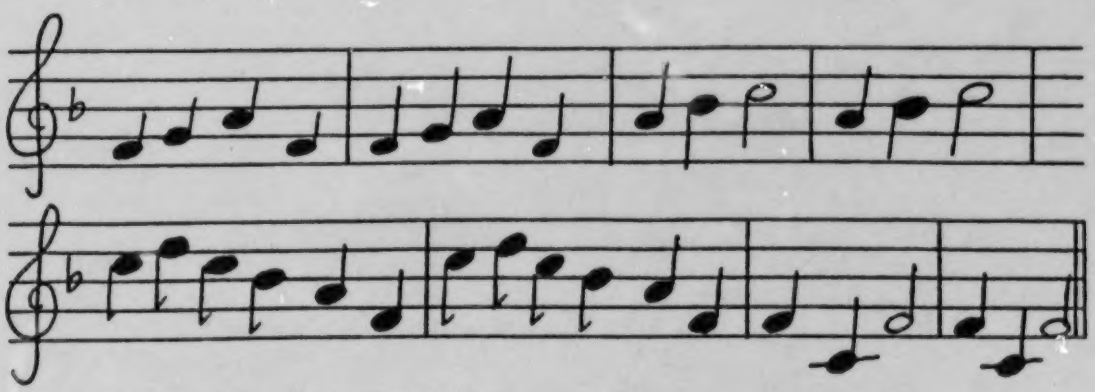
LOGO MUSIC ACTIVITY 5

Minuses, Octaves and a Flattened B

This activity explores the use of a wider range of notes, namely four octaves to the tune "Fre're Jacques". Using the song, write out the program using notes from the Bass clef and expanding it through 4 octaves. Minus after numbers are involved below. Note that $B^{b}$ is involved. The corresponding numbers for $B^{b}$ are: 6-, 6, 18 and 30.




Fre're Jacques

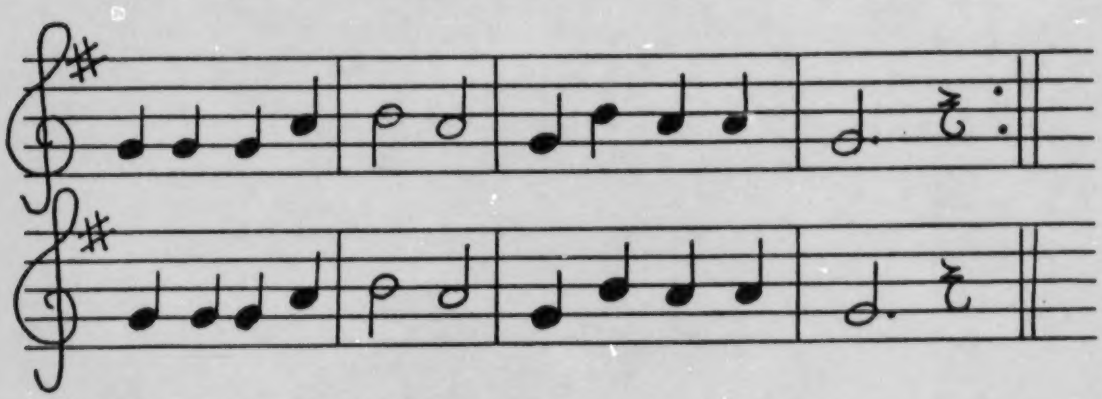


Now, program "Fre're Jacques" here:

LOGO MUSIC ACTIVITY 6

A Sharpened F and Rest by the Light of the Moon

This lesson uses F# and a quarter rest. Program this song, Au Clair De La Lune. The corresponding numbers for F# are: 2-, 2, 14 and 26. Use any of the four octaves and rearrange the music.



Program this song here:

TO _____

PLAY [ _____ ] [ _____ ]

_____ _____

_____ _____

END

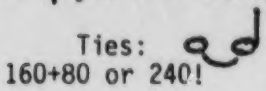
(CTRL - C)

LOGO MUSIC ACTIVITY 7

Beat the Oven

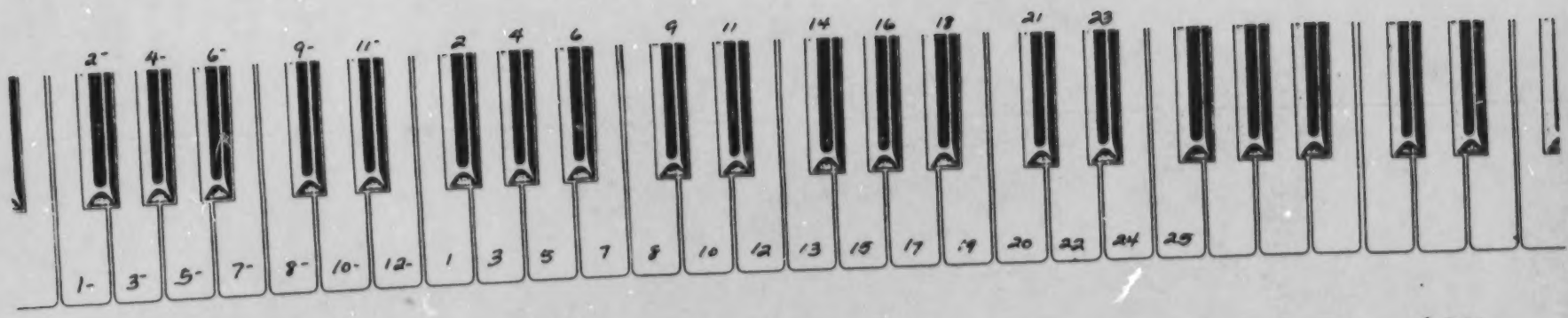
Your greatest challenge puts together everything you have learned to Beethoven's Fifth Symphony.

Note ♮ means natural. So $B^{b}$ with ♮ means plain B. Whenever you see $B^{b}$♮ you will assign the numbers 7-, 7, 19 or 31.

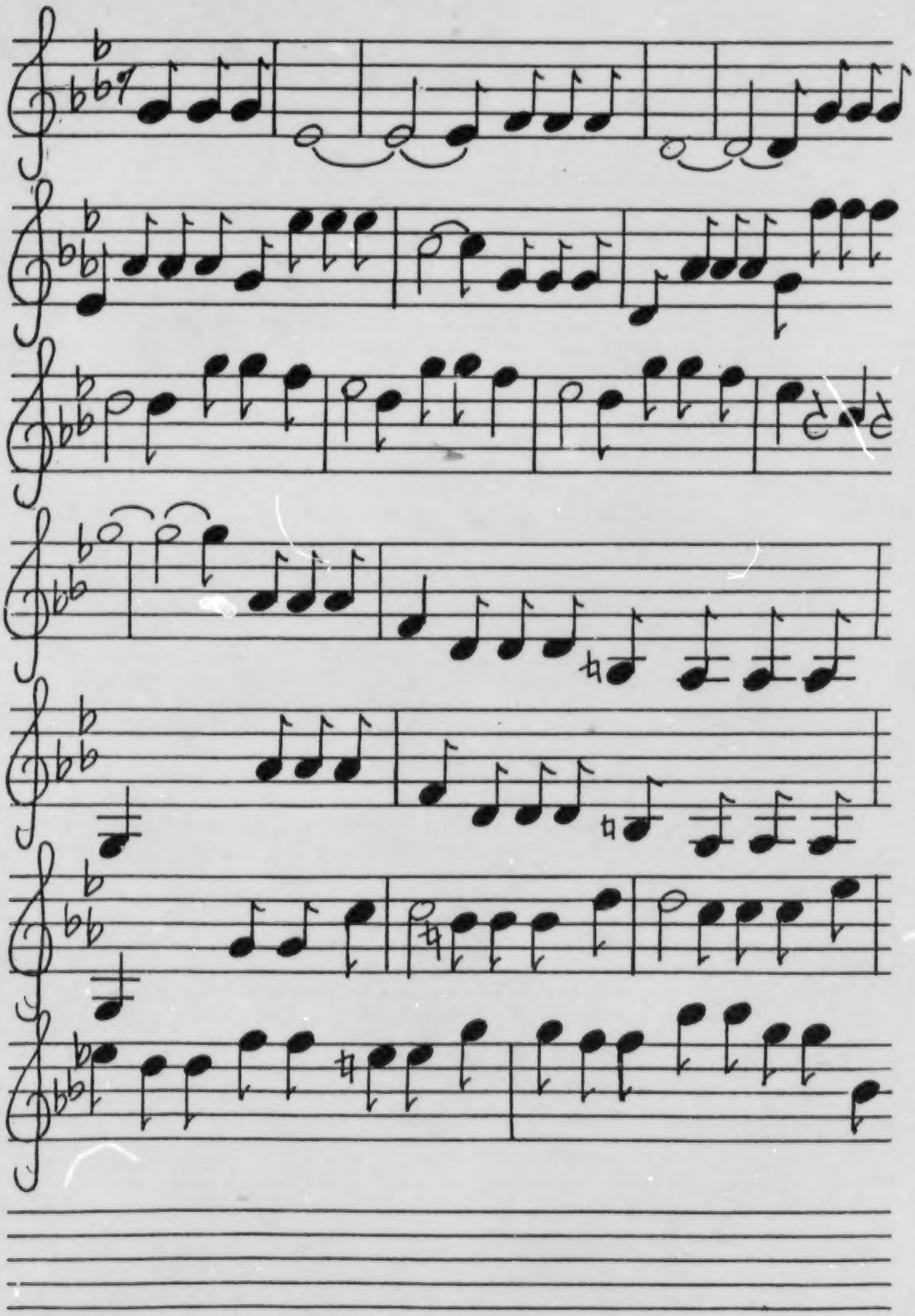
Ties:  will be a whole note plus a half note for a duration of 160+80 or 240!

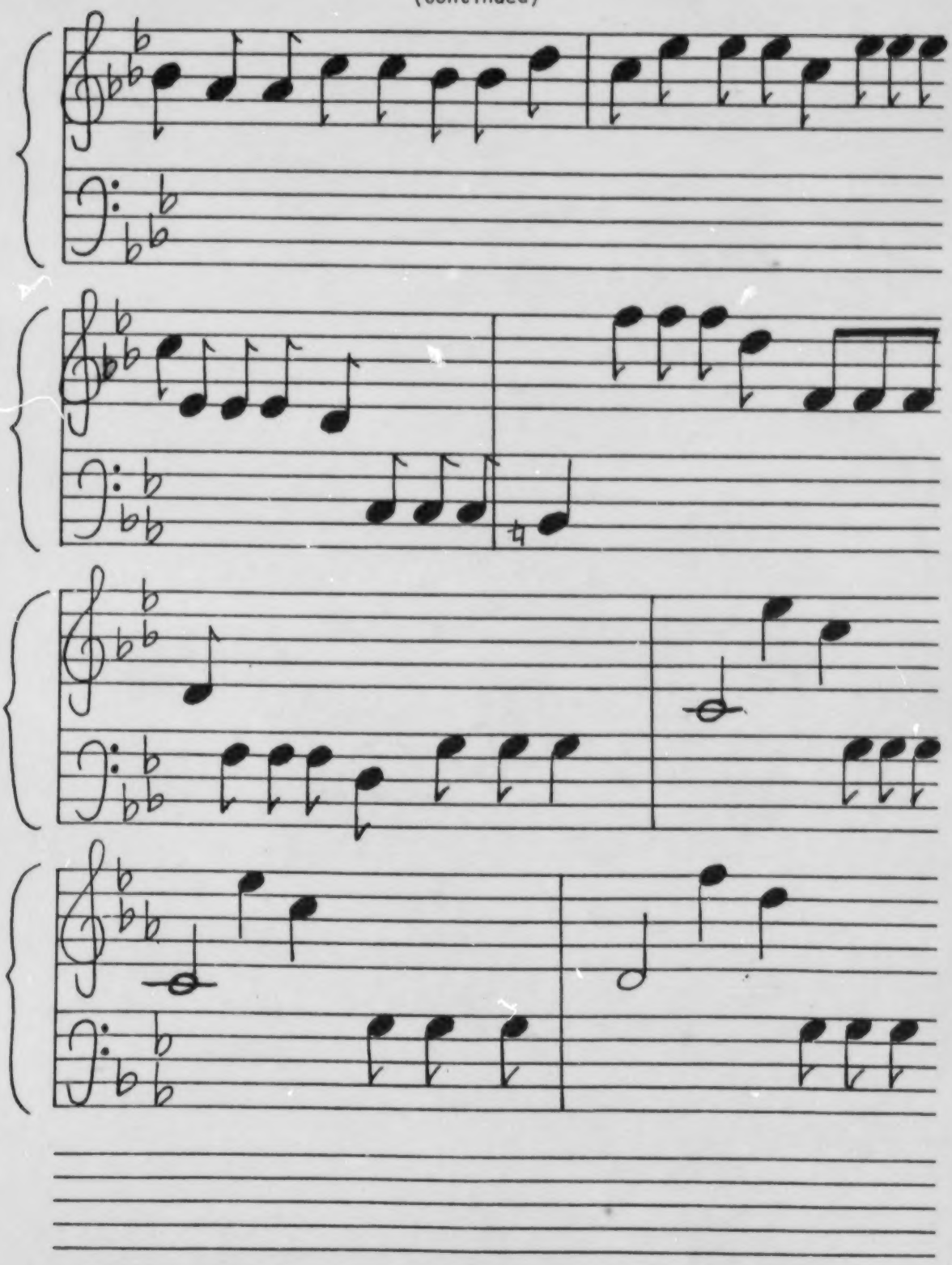
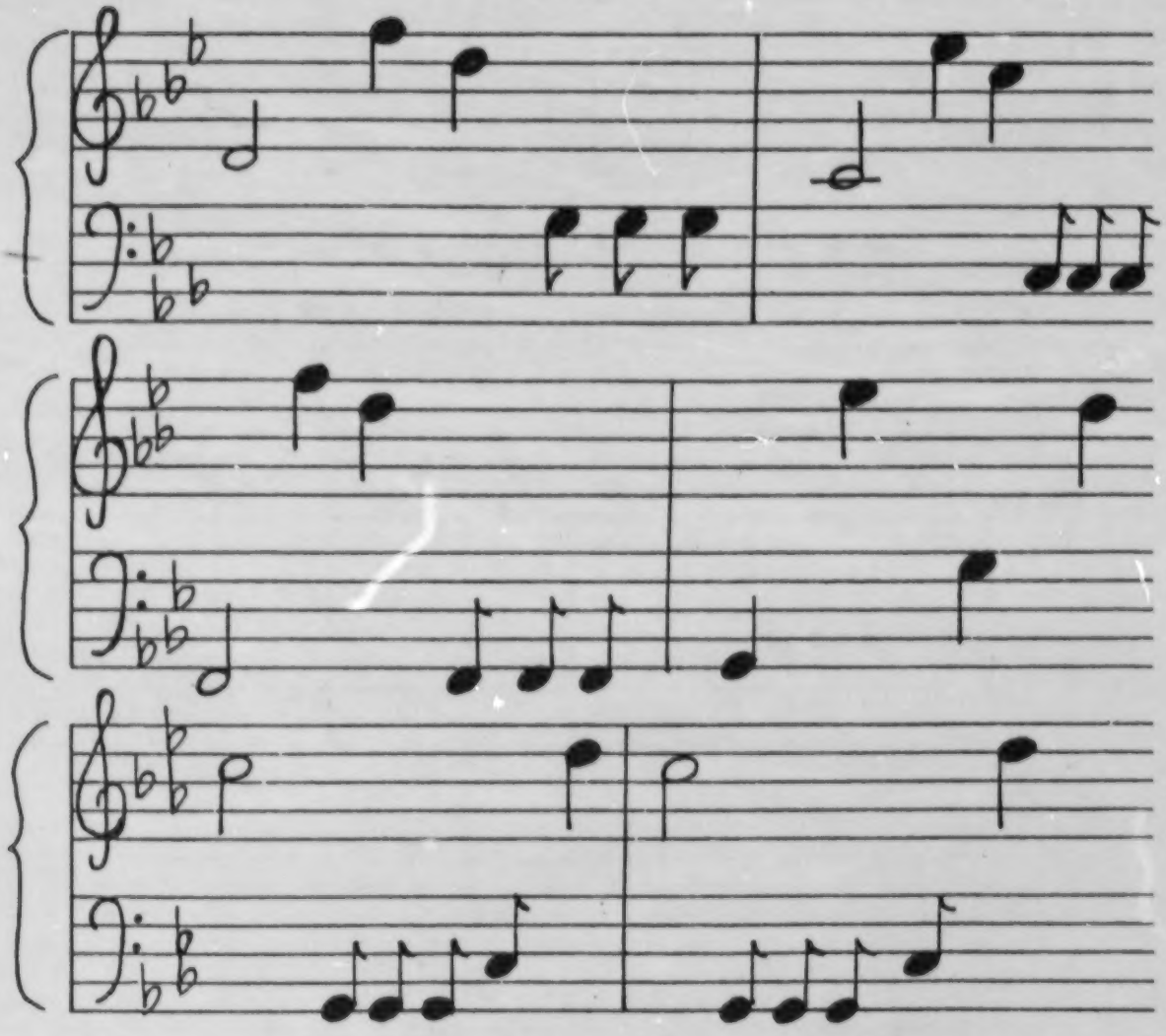
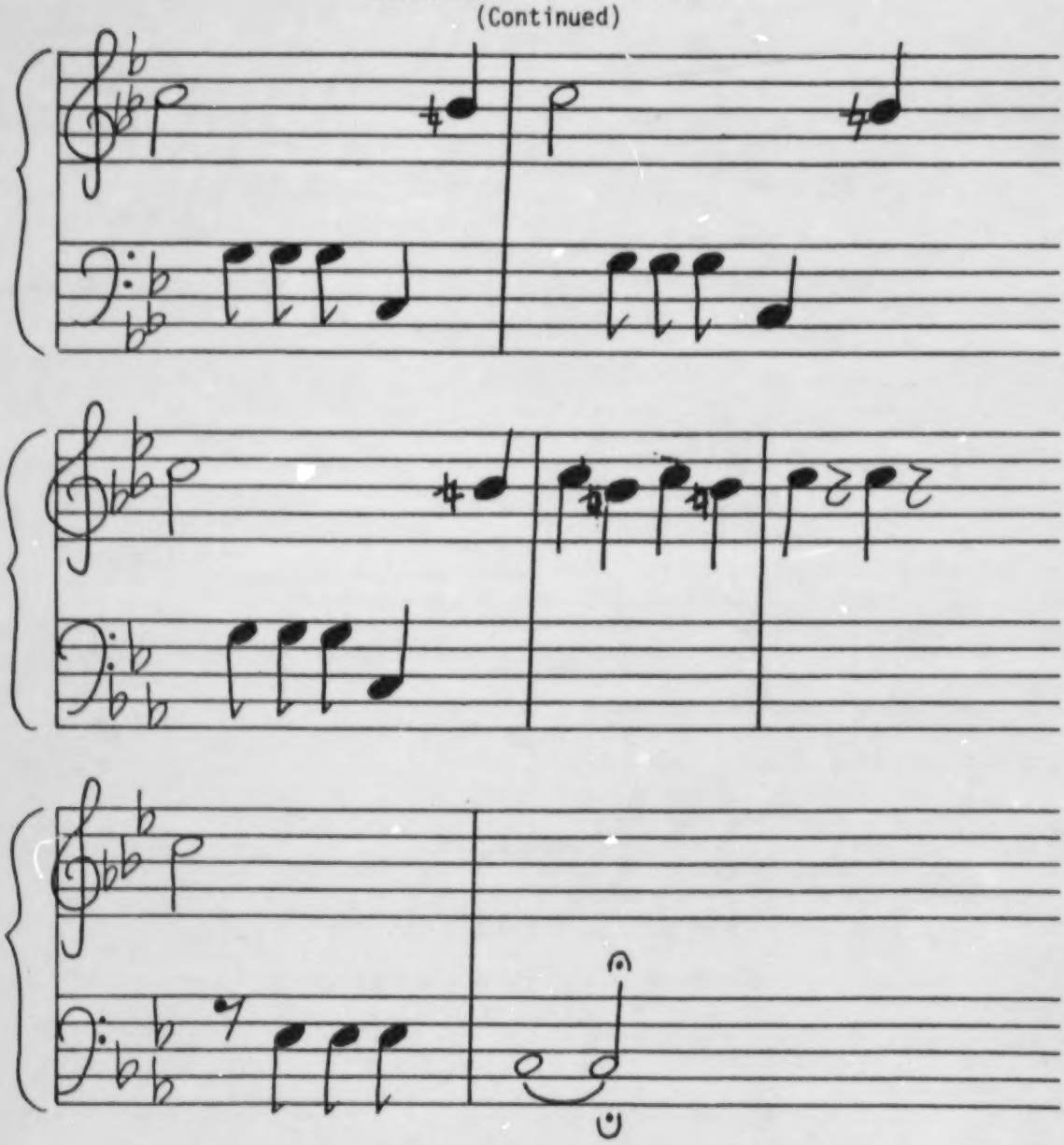
The Keyboard 8 is Middle C

126




134

135

BEETHOVEN'S FIFTH SYMPHONY

(Continued)

WORD PROCESSING

## DELETING AND INSERTING

Grades: 4-5

Performance Expectations:
- 1.1.1 Recognizes computer instructions
- 1.1.2 Reads instructions, keyboard, output
- 1.1.3 Uses control keys/commands
- 1.1.5 Experiments as a user
- 1.1.6 Responds to error messages
- 1.4.2 Operates with words/symbols

Prerequisite(s): Familiarity with keyboard.
Knowledge of how to load a word processing program.
Familiar with function keys:

a. cursor/arrow keys
b. shift key
c. control key

Equipment: Microcomputer with at least one drive

Material(s): Word processing program, initialized or formatted disk

Classroom Management: 2-3 students per computer

Time for Activity: One class period

Teacher Preparation: Be familiar with one elementary word processing program. Post enlarged picture of keyboard on wall or bulletin board nearby. Prepare paragraph for use in step 2 of Hands-On section.

Pre-Computer:

1. Discuss the difference between using a word processing program and a typewriter. Be sure students understands that the computer does not function as a word processor until the word processing program is loaded.

2. Briefly describe the functions of the peripherals to be used; e.g., the cassette tape recorder and disk drive.

3. Review "start up" and loading procedures.

4. Review menu options and/or modes.

Hands-On:

1. Have students practice turning on the equipment and loading the word processing program several times until they feel comfortable with the procedures.

2. Have a short paragraph ready for students type or have students load/retrieve a paragraph with errors from the disk to practice:

   a. The "strike-over" method for correcting
   b. Deleting letter(s) or word(s)
   c. Inserting letter(s) or word(s)

(NOTE: Please refer to your word processing program reference manuals for loading and shutting off procedures, and deleting and inserting functions.)

## SCREEN DISPLAY, TAB PROCEDURES, AND CENTERING

Grades: 4-6

Performance Expectations:
- 1.1.1. Recognizes computer instructions
- 1.1.2. Reads instructions, keyboard, output
- 1.1.3. Uses control keys/commands
- 1.1.5. Experiments as a user
- 1.1.6. Responds to error messages
- 1.4.2. Operates with words/symbols

Prerequisite(s): Knowledge of how to load a word processing program. Familiarity with function keys:

a. Cursor/Arrow keys
b. Shift key
c. Delete keys
d. Insert keys

Equipment: Microcomputer with disk drive

Materials: Word processing program, initialized or formatted disk

Classroom Management: 2-3 students per computer

Time for Activity: One class period

Teacher Preparation: Familiarity with word processing program. Prepare a sample paragraph for students to copy. Prepare transparencies showing Menu Screens such as "Screen Display" and Open Document Options"

Pre-Computer:

1. Review procedures in entering text or writing mode.
2. Explain screen displays pertinent to your particular word processing program (e.g., menu, status line, tab indents, margins). Use prepared transparencies.
3. Discuss concept of scrolling and wrapping.

Hands-On:

1. Have students load word processing program and type in prepared paragraph. Be sure students understand the concept of wrapping by having students practice moving the cursor continuously to the right so that they can see that when the cursor reaches the end of a line, it automatically moves to the beginning of the line below and continues. Moving the cursor to the left of the screen will reverse the process.

2. To further practice inserting and deleting, have students make any corrections necessary in their text.

3. Have students insert a title line above the prepared paragraph and use the proper control keys to center the title.

4. Below their sample paragraph, have the students type two columns with three words in each column, using the tab procedure.

   Example:

   | | |
   |---|---|
   | keyboard | cursor |
   | computer | memory |
   | monitor | screen |

(NOTE: Please refer to reference manuals for tabbing procedures.)

## MARGIN SETTINGS & SAVING PROCEDURES

Grades: 4-6

Performance Expectations:
- 1.1.1 Recognizes computer instructions
- 1.1.2 Reads instructions, keyboard, output
- 1.1.3 Uses control keys/commands
- 1.1.5 Experiments as a user
- 1.1.6 Responds to error messages
- 1.2.1 Rationalizes information processing
- 3.2.1 Identifies applications
- 3.3.1 Values efficient information processing

Prerequisites: Knowledge of how to load word processing program.
Familiarity with function keys, tabs, indents.
Ability to set and clear tabs.
Ability to delete and insert.

Equipment: Microcomputer with disk drive, printer

Materials: Word processing program, initialized or formatted disk, printing paper

Classroom Management: 2-3 students per computer

Time for Activity: One class period

Teacher Preparation: Have printer ready. Prepare printed samples of text showing different margins to allow children to visualize effect of changing margin settings.

Hands-On: Given an assignment, the student(s) should learn to:

a. name their text
b. set left and right margins and other formatting commands
c. type and save text

1. Review the formatting commands for setting and clearing tabs.

2. Introduce procedures for setting left and right margins. Let students see samples of printed text showing different margin settings. Encourage students to use their mathematical skills and calculate how many spaces are available both horizontally and vertically on the paper they will be using. See if students can determine their margin settings before printing text.

3. Have children select one of these ideas as an assignment:

   a. Thank you letter
   b. Friendly letter
   c. Creative story
   d. Sports story

4. Be sure that students give their text a file name.

5. Introduce procedure for saving text. Have students follow procedure and save their text.

(NOTE: See reference manuals of your word processing program for instructions on setting margins and saving/storing commands.)

## RETRIEVING, EDITING, AND PRINTING TEXT

Grades: 5-6

Performance Expectations:
- 1.1.3 Uses control keys/commands
- 1.1.5 Experiments as a user
- 1.1.6 Responds to error messages
- 1.2.1 Rationalizes information processing
- 3.2.1 Identifies applications
- 3.3.1 Values efficient information processing
- 3.3.2 Understands pros/cons of routine tasks

Prerequisite: Ability to type and store text under a file name

Equipment: Microcomputer with disk drive, printer

Materials: Word processing program, initialized or formatted disk, printing paper

Classroom Management: 2-3 students per computer

Time for Activity: One-fourth of class period for instructions. The rest of the period should be given to students to complete and/or print their text.

Teacher Preparation: Have printer ready for printing

Pre-Computer: Discuss kinds of printers available and the type your school is using.

Demonstrate:

a. How to use printer; commands for stopping and restarting printing
b. Procedures to gain access to printer
c. Procedures to follow should breakdown occur

Hands-On:

1. Introduce procedure for retrieving text from disks. Once text is retrieved, allow students time to edit, proofread, continue, or complete text.

2. Introduce procedure for printing text. Have students follow procedures and print text or print under adult supervision.

Follow-up: Students should be encouraged to keep an individual folder with notes from each session or lesson, hand-outs, and printed copies of their work.

(NOTE: See your reference manuals for retrieving files and printing commands.)

## MARGIN CHANGES AND LINE SPACING

Grades: 5-6

Performance Expectations:
- 1.1.3 Uses control keys/commands
- 1.1.5. Experiments as a user
- 1.1.6. Responds to error messages
- 3.2.1. Identifies applications
- 3.3.1. Values efficient information processing
- 3.3.2. Understands pro/cons of routine tasks
- 4.2.1. Describes how computers assist people

Prerequisite: Knowledge of procedures for setting right and left margins of text

Equipment: Microcomputer with disk drive, printer

Materials: Word processing program, initialized or formatted disk, printing paper

Classroom Management: 2-3 students per computer

Time for Activity: One class period

Teacher Preparation: Have printer ready for printing. Have prepared sample(s) showing various margin settings for varied effect.

Pre-Computer: Discuss with students the reasons for changing margins within their text for particular effects. Students may wish to have different margin settings within their text; e.g., one set of margins for a poem and another set of margins for the description of the poem.

Demonstrate commands for changing the margin settings and other formatting commands.

Hands-On: Have students retrieve text from files.
Review commands for changing margin settings and have students change the margins of paragraphs in their document.

Have students use formatting commands such as page length, number of printed lines per page, and double spacing.

Have students print their text so that they may see the effects of these changes.

(NOTE: See reference manuals for formatting and printing commands.)

## BLOCK MOVES AND OTHER FEATURES

Grade: 6

Performance Expectations:
- 1.1.3 Uses control keys/commands
- 1.1.5 Experiments as a user
- 1.1.6 Responds to error messages
- 1.2.1 Rationalizes information processing
- 3.2.1 Identifies applications
- 3.3.1 Values efficient information processing
- 3.3.2 Understands pros/cons of routine tasks
- 4.2.1 Describes how computers assist people

Prerequisites: Ability to type and store text.
Ability to retrieve file from directory.
Ability to set left and right margins.

Equipment: Microcomputer with disk drive, printer

Materials: Word processing program, initialized or formatted disk, printing paper

Classroom Management: 1-2 students per computer

Time for Activity: One class period

Teacher preparation: Have printer ready for printing

Pre-Computer:

1. Demonstrate alternative procedures for inserting and deleting words and sentences if your word processing program allow these.
2. Demonstrate procedures used in your word processing program for transferring blocks of text.
3. Demonstrate procedures for saving changes or revisions.

Hands-On:

1. Have students retrieve file from disk.
2. Have students practice inserting and deleting words and sentences in several places within their text.

3. Have students practice transferring one or two paragraphs or sentences to different locations within their document.

4. Have students proofread their text and save changes onto their disks.

5. Allow students to print out their text after the changes and revisions are made.

(NOTE: See reference manuals for other block commands.)

## IDEAS FOR WORD PROCESSING APPLICATIONS

1. Friendly Letters
2. Letters to Parents
3. Thank-you Letters
4. Creative Writing
5. Report Writing
6. Class Newsletter
7. School Newspaper
8. PTA Flyers
9. Open House Invitations
10. Research Papers
11. Language Arts Assignments

BASIC

# INTRODUCTION TO BASIC

Grades: 4-6

Performance Expectations: 1.1.1 Recognizes computer instructions
1.1.3 Uses basic control keys/commands
1.4.1 Recognizes programming languages

Curriculum Areas: Computer Literacy

Prerequisites: None

Materials: PEOPLE/COMPUTER LANGUAGE #1
PEOPLE/COMPUTER LANGUAGE #2
PEOPLE/COMPUTER LANGUAGE #3

Classroom Management: Pre-Computer - Total Class
Hands-On - Small Group

Time for Activity: Pre-Computer - One Class Period
Hands-On - One-half Class Period

Pre-Computer: Translation of People Language to Computer Language.

Provide children with background of the many languages in the world and how people communicate in different languages (e.g., English, Hawaiian, Japanese, sign). Ask children if they know any foreign words/phrases and the English translation for each. Explain that people can communicate effectively if they speak in a language that the listener/receiver can understand. In the same manner, people must "speak" (input to the computer in a language that it understands. One language that the computer understands is called BASIC. Therefore, to "talk" to the computer or for the computer to understand directions, we must translate "people language" to "computer language". Distribute Worksheet #1 to the students. Explain the translation of each item. Emphasize that words/letters must be enclosed by quotation marks.

Point out to students that there are some words or symbols that are common to both people and computer languages. For example, the plus (+) and minus (-) signs are understood in both languages. However, the multiplication sign (x) in people language must be translated to an asterisk (*) in BASIC. Also, the division signs (÷, ⌐) must be typed in through the keyboard as a slash (/).

Hands-On:

1. Copy column 1 of Worksheet #2 on the board, chart paper or overhead transparency. Column 1 is a list of terms in "people language". Discuss the translation to computer language (column 2) which is also what is typed on the keyboard. Demonstrate on the computer how to translate the first 2 - 4 items (input). Show the students what is shown on the monitor (output). Complete the rest of the items in column 2 with total class participation. Have students type this into the computer and complete column 3.

2. Distribute worksheet #3. Students must translate "people language" into computer language.

   a. Column 1 contains statements written in people language.

   b. In column 2, students must write the computer equivalent of column 1. The student writes what should be typed on the keyboard. To verify answers, the students may then go to the computer and type in their written responses.

   c. In column 3, the students write what is shown on the screen as output.

Worksheet 1

PEOPLE/COMPUTER LANGUAGE #1

| People Language | Computer Language |
| --- | --- |
| + | |
| - | |
| x | |
| ÷ | |
| ⌐ | |
| WRITE | |
| WORDS, Letters | |
| numbers | |
| column spaces | |

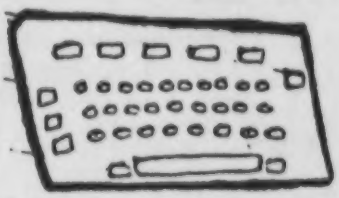
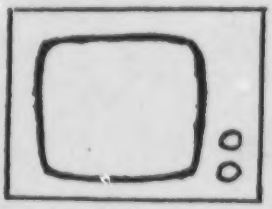
Worksheet 1
Answer Sheet

PEOPLE/COMPUTER LANGUAGE #1

| People Language | Computer Language |
|---|---|
| + | + |
| - | - |
| x | * |
| ÷ | / |
| $\sqrt{\ }$ | / |
| WRITE | PRINT |
| WORDS, Letters | "_____" |
| numbers | numbers |
| column spaces | , |

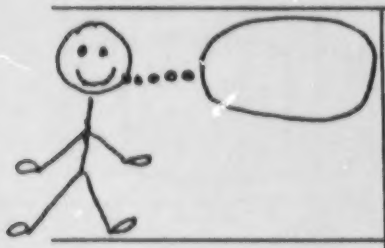
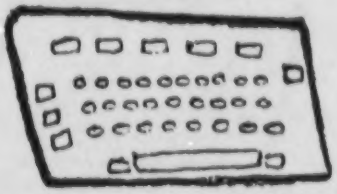
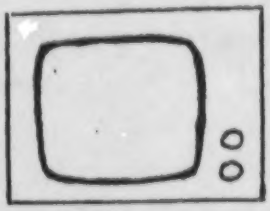
Worksheet 2

PEOPLE/COMPUTER LANGUAGE #2

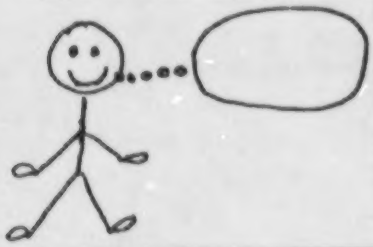
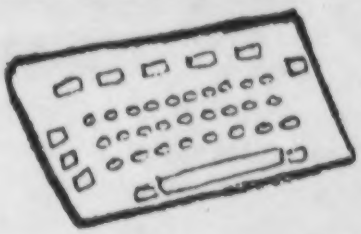
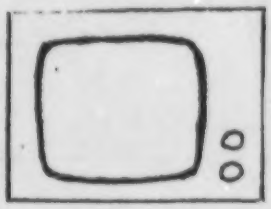
| People Language | Computer Language | |
|---|---|---|
| |  |  |
| What a person says | What is typed through keyboard | What is shown on the monitor after entering information (pressing return) |
| 25 + 10 | | |
| 15 - 10 | | |
| 6 x 4 | | |
| 15 ÷ 3 | | |
| $\sqrt{30}$ | | |
| Write the name of your school | | |
| Write your middle name | | |
| Write your phone number | | |
| Write your age | | |

Worksheet 2
Answer Sheet

PEOPLE/COMPUTER LANGUAGE #2

| People Language | Computer Language | |
|---|---|---|
|  |  |  |
| What a person says | What is typed through keyboard | What is shown on the monitor after entering information (pressing return) |
| 25 + 10 | answer: PRINT 25 + 10 | answer: 35 |
| 15 - 10 | answer: PRINT 15 - 10 | answer: 5 |
| 6 x 4 | answer: PRINT 6 * 4 | answer: 24 |
| 15 ÷ 3 | answer: PRINT 15/3 | answer: 5 |
| $6\overline{)30}$ | answer: PRINT 30/6 | answer: 5 |
| Write the name of your school | answer: PRINT "_____" (insert correct school name) | answer: _____ school name |
| Write your middle name | answer: PRINT "____" | answer: _____ |
| Write your phone number | answer: PRINT _ _ _ _ _ _ _ | answer: _ _ _ _ _ _ _ |
| Write your age | answer: PRINT _ _ | answer: _ _ |

PEOPLE/COMPUTER LANGUAGES #3

|  |  |  |
|---|---|---|
| People Languages | Computer Language | |
| 10 + 10 | | |
| 25 - 15 | | |
| 5 x 5 | | |
| 10 ÷ 2 | | |
| $5\overline{)10}$ | | |
| Write your name | | |
| Hello | | |
| Goodbye | | |

# BASIC COMMANDS AND STATEMENTS

Grades: 5-6

Performance Expectations:
- 1.1.1 Recognizes computer instructions
- 1.1.3 Uses basic control keys/commands
- 1.1.5 Experiments as a user
- 1.2.3 Sequences process steps
- 1.4.1 Recognizes programming languages

Curriculum Areas: Computer Literacy

Prerequisites: none

Materials:
- Worksheet #1 BASIC COMMANDS AND STATEMENTS
- Worksheet #2 FLASH!
- Worksheet #3 FLASH AND INVERSE
- Worksheet #4 FLASH AND BEEP

Classroom Management:
- Pre-Computer - Total Class
- Hands-On - Small Groups

Time for Activity:
- Pre-Computer - One Class Period
- Hands-On - One-half Class Period

Pre-Computer:

1. Discuss and explain the Worksheet #1.
   Explain the difference between commands and statements.
   Commands are direct instructions to the computer. Statements are indirect instructions to the computer, usually contained within a program.

2. Discuss and explain the requirements for writing a simple BASIC program. (See Worksheet #1.)

3. Discuss with the total class how to write a program that would print the word "FIRE" in flashing letters and make it beep. (A sample sequence is shown on Worksheet #2.)

Hands-On: Have the children work in small groups on worksheets 3 and 4. Allow them to experiment with the commands and to develop their own solution.

# BASIC COMMANDS AND STATEMENTS

COMMAND OR STATEMENT - tells the computer to do something

NEW - erases programs in the computer's memory
RUN - tells the computer to make the program "go"
HOME - clears screen (but not memory)
LIST - tells the computer to list the program on the screen
GOTO - goes to the specified line number
PRINT - prints a value or what is typed between the quotation marks
" "
PRINT _____
CHR$(7)- tells the computer to beep (on the Apple IIe)
INVERSE - prints dark letters on bright background
FLASH - tells the computer to make the letters blink
NORMAL - tells the computer to change the screen back to normal.

REM - remark; reminder of what the program is all about
END - end of the program; finished

REQUIREMENTS FOR WRITING A SIMPLE PROGRAM

1. Line Numbers (usually in increments of 10)
2. Rem statement
3. End statement

(Sample)

```
10  REM
20  HOME
30  _____________________
40  _____________________
50  END
    RUN
```

# FLASH!

Write a program that will print the word "FIRE" in flashing letter and make the computer beep.

Sample Program for Apple IIe:

```
10  REM  FLASH AND BEEP
20  HOME
30  FLASH
40  PRINT CHR$ (7)
50  PRINT "FIRE"
60  NORMAL
70  END
    RUN
```

Note: To stop the program on the Apple IIe, press CTRL-C. Check manual for other microcomputers.

WORKSHEET 3

## FLASH AND INVERSE

HANDS-ON ACTIVITY:

Write a program that will flash your first name and print your last name in inverse.

| | | For the Teacher Only (possible answer) |
|---|---|---|
| 10 | REM _____ | Flash and Inverse |
| 20 | _____ | HOME |
| 30 | _____ | FLASH |
| 40 | _____ | PRINT "First name" |
| 50 | _____ | INVERSE |
| 60 | _____ | PRINT "Last name" |
| 70 | _____ | NORMAL |
| 80 | _____ | END |

# FLASH AND BEEP

## HANDS-ON ACTIVITY

1. How would you make the world "HELP" appear three times across the screen and also make it flash and beep?

| | | For the Teacher Only (possible answer) |
|---|---|---|
| 10 | REM _____ | Flash and beep |
| 20 | _____ | HOME |
| 30 | _____ | FLASH |
| 40 | _____ | PRINT CHR$(7) |
| 50 | _____ | PRINT "HELP,HELP, HELP" or PRINT "HELP", "HELP" "HELP" |
| 60 | _____ | NORMAL |
| 70 | _____ | END |

2. What else can you do to make this program different?

# FLOWCHARTING I

Grade: 5-6

Performance Expectation(s): 2.1.2 Creates program from flowchart

Curriculum Area(s): Computer Literacy, Mathematics

Prerequisite(s): Has had some experience with programming and the logical development of program steps.

Material(s): Blackboard, student copies of Treasure, page 162, ruler, pencil.

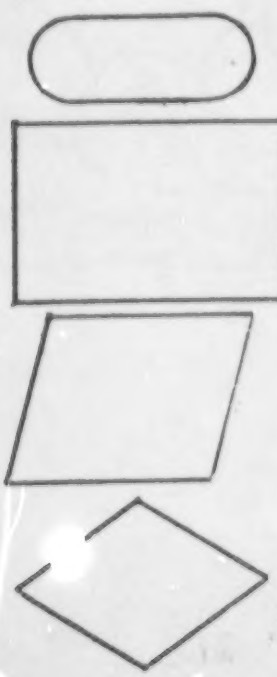
Classroom Management: Total class

Time for Activity: One-half class period

Teacher Preparation: Make copies of Treasure page 162.

Pre-Computer: Give the following information/instructions to the students:

1. Draw the following flowchart symbols around the steps leading to the TREASURE page :



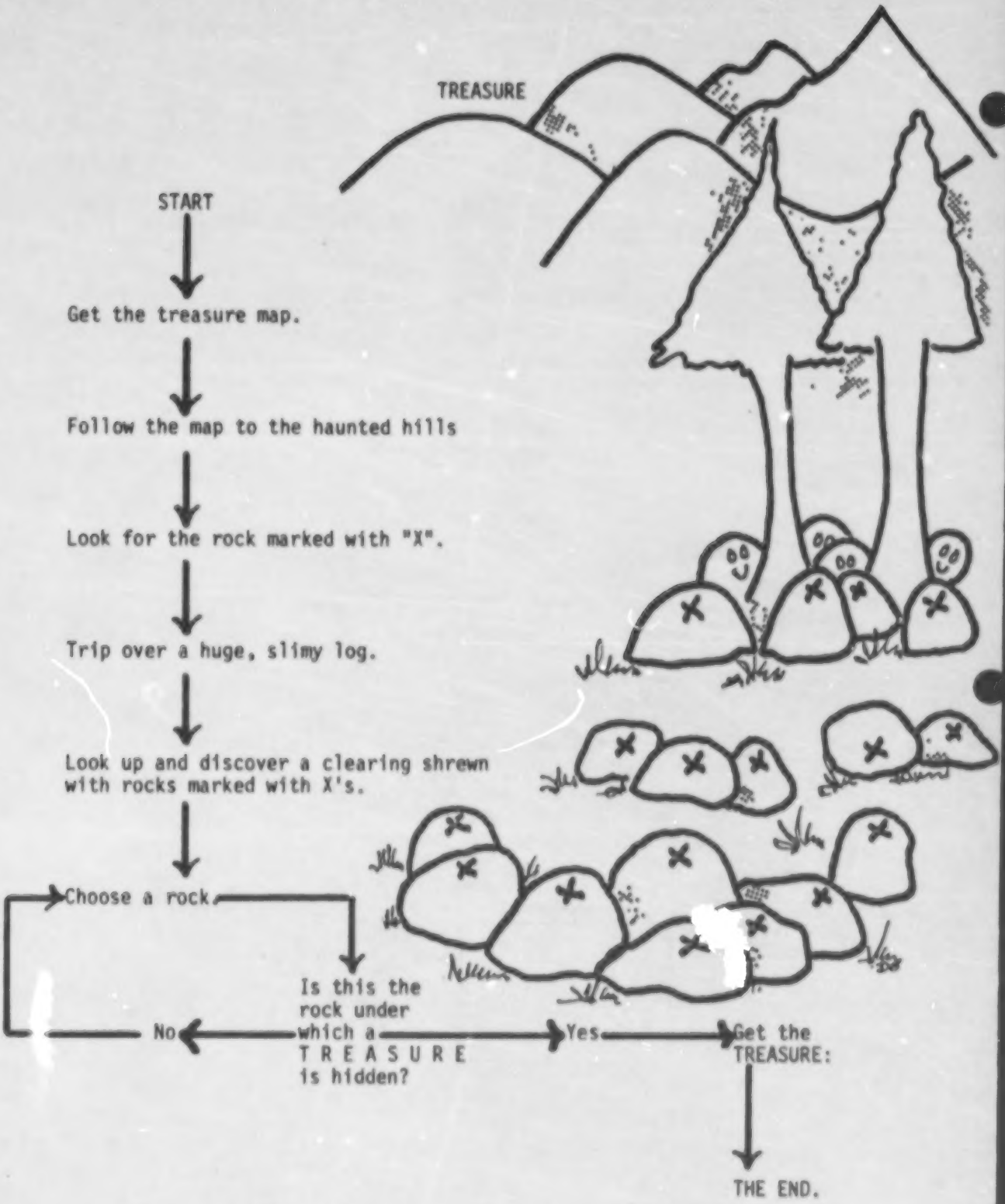
to mark the beginning and end.

to mark an action step.

to mark a step where information is entered (INPUT) or results are returned (OUTPUT)

to mark a step that requires a decision to be made.

161


TREASURE
START
Get the treasure map.
Follow the map to the haunted hills
Look for the rock marked with "X".
Trip over a huge, slimy log.
Look up and discover a clearing shrewn with rocks marked with X's.
Choose a rock
Is this the rock under which a TREASURE is hidden?
No
Yes
Get the TREASURE:
THE END.

FLOWCHARTING II

Grade: 5-6

Performance Expectation(s): 2.1.2 Creates program from flowchart

Curriculum Area(s): Computer, Mathematics

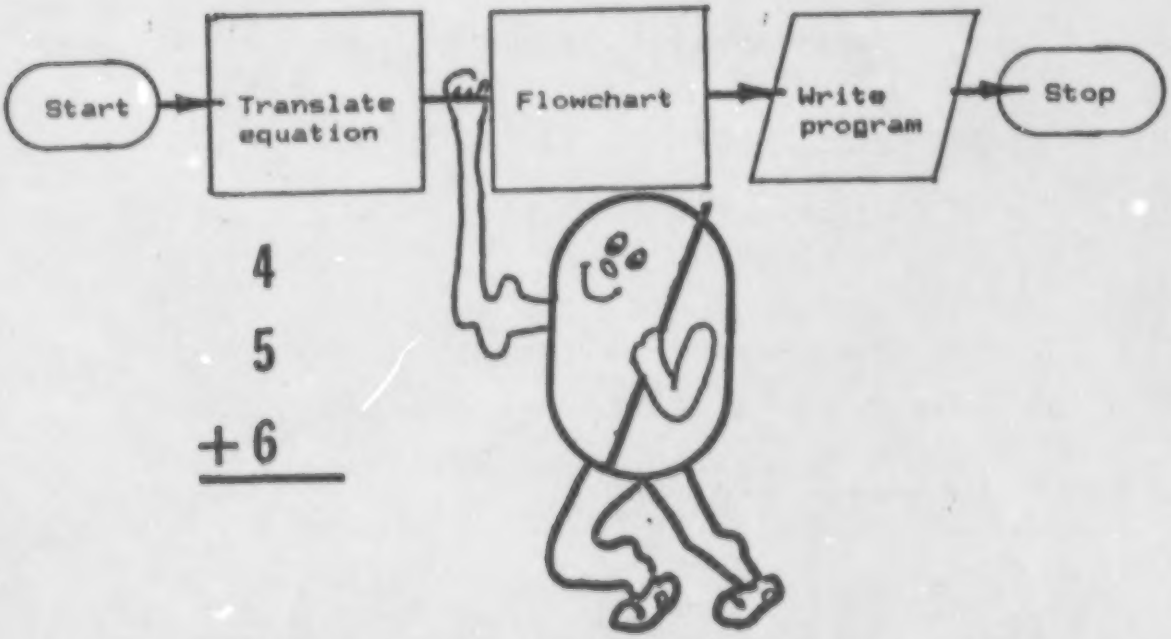
Prerequisite(s): Knows some flowchart symbols and has had some experience writing simple programs in BASIC using line numbers.

Material(s): Blackboard/paper, initialized disk to run BASIC program.

Classroom Management: Total class

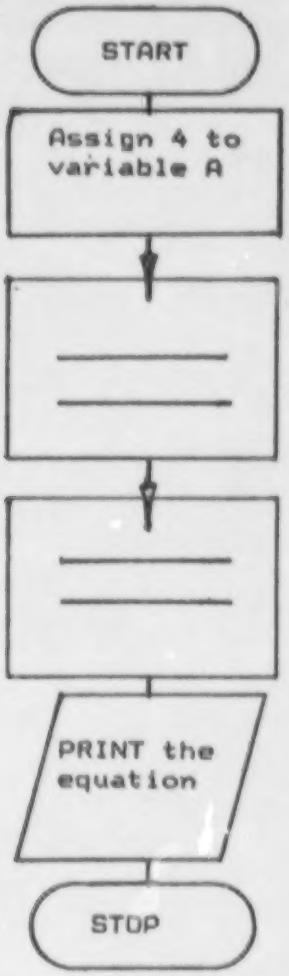
Time for Activity: One half class period

Teacher Preparation: Write and run program on computer.



Pre-computer: This activity involves translating an equation into a flowchart and writing a simple program in BASIC. Give the following instructions to the students:

1. A LET statement assigns a value (e.g., 4) to a variable (e.g., A). A is called a variable and 4 is the value assigned to it. Complete the flowchart and the program steps:




LET A=4

LET B= _____

------ ------

PRINT A;"+";B;"+";C;"=";A+B+C

END

2. Write the program using line numbers.

3. Predict the outcome and RUN the program on the computer.

4. Write a short program using another number operation (subtraction, multiplication, or division).

# FLOWCHARTS TO ALGORITHMS

Grade: 5-6

Performance Expectation(s): 2.1.2 Creates program from flowchart

Curriculum Area(s): Computer Literacy, Mathematics

Prerequisite(s): Some experience in BASIC programming using line numbers, PRINT and LET statements.

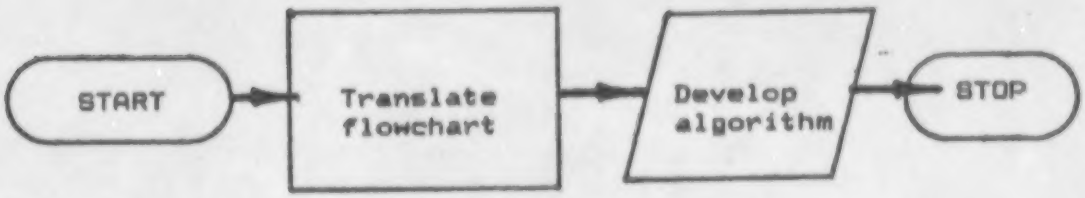
Material(s): Blackboard/paper

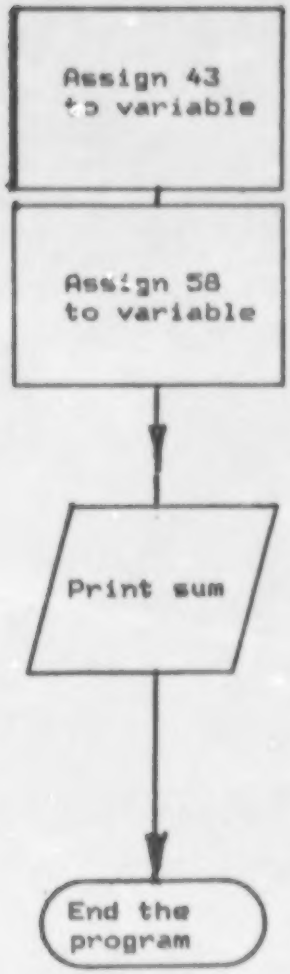
Time for Activity: One-half class period

Teacher Preparation: Provide additional problems for developing algorithms from flowcharts.

Pre-Computer: Walk through the following activity with the students to develop an algorithm (a step-by-step procedure from a flowchart):

1. Translate the flowchart information into an algorithm:






Explain what is meant when a number (43) is assigned to a variable.

What is the second step?

What kind of arithmetic operation (addition, subtraction, multiplication, or division) will solve the problem which involves a sum? How can it be written so that the computer will solve it for you?

2. Use the information above to write a short program using LET and PRINT statements. How would you use the variables so that the output might read:

THE SUM OF 43 AND 58 IS 101.

or

43 + 58 = 101

## ALGORITHMS TO PROGRAMMING

Grades: 5-6

Performance Expectations: 2.1.3 Develops algorithm for problem solving

Curriculum Areas: Computer Literacy, Mathematics

Prerequisites: Some experience in BASIC programming using line numbers, PRINT and LET statements

Materials: Blackboard/paper, initialized disk to test/RUN program

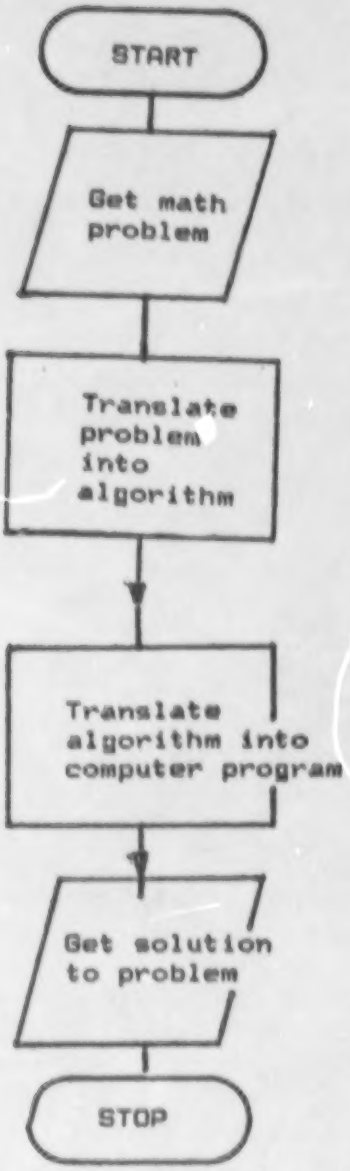
Classroom Management: Total class

Time for Activity: One-half class period

Teacher Preparation: Additional word problems to translate into algorithms and computer programs

Pre-Computer: This activity involves the translation of a given word problem into algorithm and the writing of a program to solve the problem. Use the following questions with the students:

1.




How many square feet are there in a rug 12 feet by 12 feet?

Give the numbers a name and decide what arithmetic operation (addition, subtraction, multiplication, or division) will solve the problem.

Use one LET statement and 3 program lines:

```
10
20
30
```

The sentence, "THE AREA OF THE RUG IS 144 SQUARE FEET." should be displayed on the screen when the program is RUN.

2. Write an equation for solving the following problem and write a short program in BASIC. The sentence, "THE TRAIN TRIP TOOK _____ HOURS." should be displayed as the answer on the screen when the program is RUN. (Your answer should replace the ____.)

Traveling at the rate of 49 miles per hour a train covered a distance of 294 miles. How many hours did the trip take?

3. Write a program in BASIC to solve the following problem. The sentence that is displayed on the screen should read: THE DISCOUNTED PRICE IS _____.

> A shirt that regularly sold for $25 was on sale for 1/5 (or 20%) off its original price. What was the discounted price of the shirt?

## PROGRAMMING WORD PROBLEMS I

Grade: 6

Performance Expectations: 2.1.2 Creates program from flowchart

Curriculum Areas: Computer Literacy, Mathematics

Prerequisites: Some programming in BASIC using LET and PRINT statements

Materials: Blackboard/paper

Classroom Management: Total class

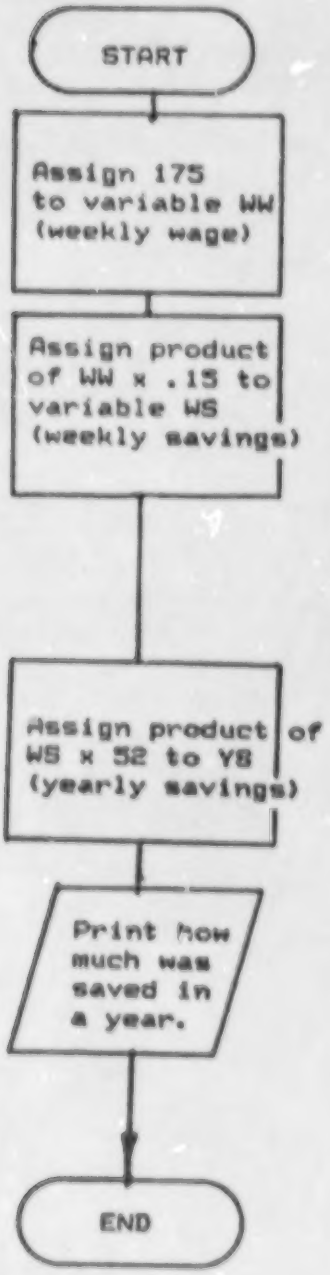
Time for Activity: One-half class period

Teacher Preparation: None

Pre-Computer: This activity involves writing a program in BASIC using flowchart information.

1. Write a program for the following problem using LET and PRINT statements to solve the problem:

   If a person who earns $175 a week, saves 15% of his salary, how much can he save in one year's time?


START
Assign 175 to variable WW (weekly wage)
Assign product of WW x .15 to variable WS (weekly savings)
Assign product of WS x 52 to YS (yearly savings)
Print how much was saved in a year.
END

# PROGRAMMING WORD PROBLEMS II

Grade: 6

Performance Expectations: 2.1.2 Creates program from flowchart

Curriculum Areas: Computer Literacy, Mathematics

Prerequisites: Some programming experience in BASIC using LET and PRINT statements.

Materials: Blackboard/paper

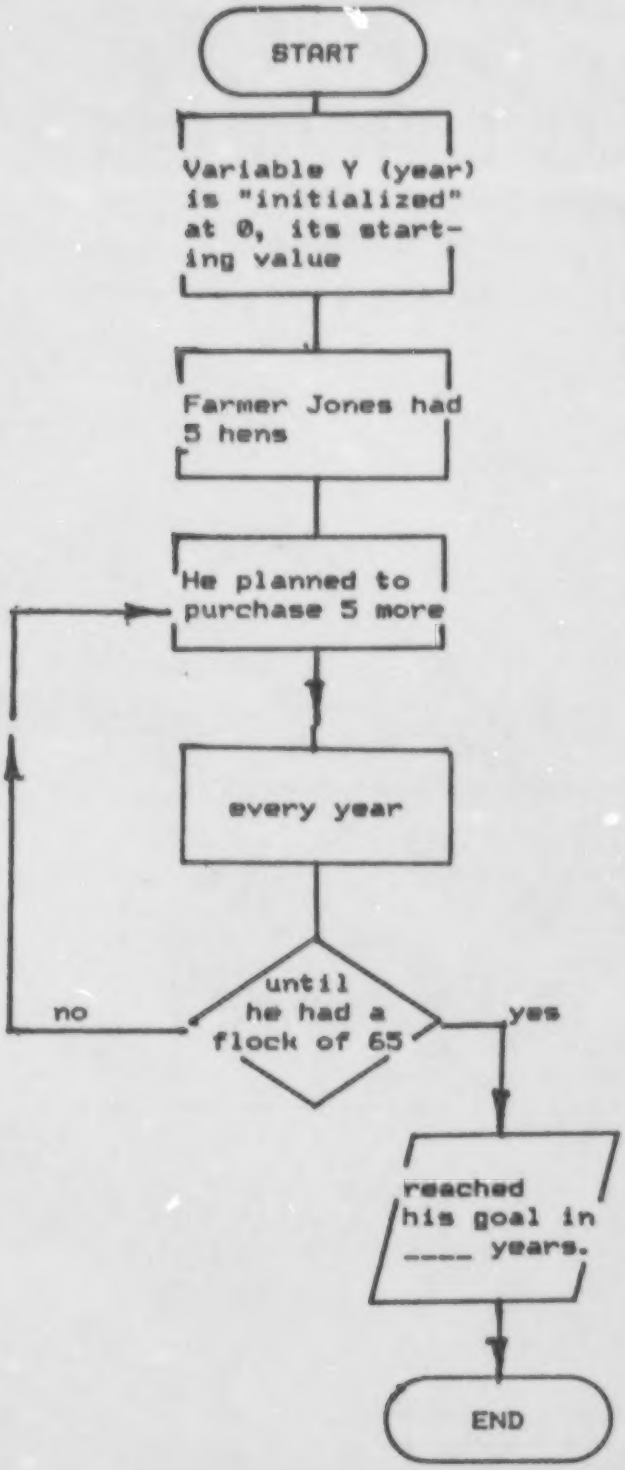
Classroom Management: Total class

Time for Activity: One-half class period

Teacher Preparation: None

Pre-Computer: Use the flowchart on the following page to walk through the following activity with the students. Have students write a program in BASIC based on the information in the flowchart:

1. Write a program using the information from the flowchart below.


START
Variable Y (year) is "initialized" at 0, its starting value
Farmer Jones had 5 hens
He planned to purchase 5 more
every year
until he had a flock of 65
no
yes
reached his goal in ____ years.
END

_____

_____

_____

_____

IF __ <65 THEN GOTO ____

_____

_____

_____

## COMPARISON OF LANGUAGES

Grades: 5-6

Performance Expectation(s): 1.4.1 Recognizes programming languages

Curriculum Area(s): Computer Literacy

Prerequisite(s): Experience with Logo and BASIC commands and programming.

Material(s): Blackboard/paper, chart paper, initialized disk and Logo disk.

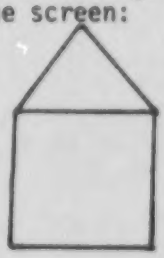
Classroom Management: Total class

Time for Activity: One-half to one class period

Teacher Preparation: Identify areas of similarity and differences between Logo and BASIC.

Hands-On: Give the following instructions to the students:

1. Write two programs (one in BASIC and the other in Logo) so that this figure or a facsimile can be produced on the screen:



2. RUN and test the programs.

3. Computer programs (a set of instructions given to the computer to direct its operations) enable users to communicate with computers. In what ways are BASIC and Logo similar? In what ways are they different?

# PROBLEM SOLVING IN BASIC LANGUAGE

Grades: 5-6

Performance Expectations:
- 1.1.1 Recognizes computer instructions
- 1.1.2 Reads instructions, keyboard, and output
- 1.1.5 Experiments as a user
- 1.4.2 Operates with words/symbols
- 1.2.3 Sequences process steps
- 1.4.1 Recognizes programming languages

Curriculum Area: Computer Literacy

Prerequisite: Some experience with BASIC programming

Materials: Worksheets, pages 176 to 181.

Classroom Management: Whole class for Pre-Computer Activities; Pairs or individuals for Hands-On Activities.

Time for Activity: One class period per activity.

Teacher Preparation: Review the appropriate BASIC commands before each lesson (GOTO, FOR-NEXT, READ-DATA)

Pre-Computer Activities: Complete the worksheets. Discuss if necessary. Predict the outcome of each program in the space provided.

Computer Activities: Verify the answers (predicted outcomes) by running programs on the computer.

Follow-up/Enrichment:

1. Find similar problems to try at the computer.
2. Have students create problems for each other to solve.

Comments or Suggestions:

## GOTO, COMMAS AND SEMI-COLONS

GOTO means "Go to" another statement in the program. GOTO enables you to "jump around" in a program. The computer can jump "up" or "down". Here are examples. (See if you can predict the answer at your seat before using the computer to find the output.)

1. Write your prediction on this sheet, followed by the answer which you find on the computer.

PREDICTED OUTCOME COMPUTER OUTPUT

```
10    PRINT "JUMP DOWN"
20    GOTO 60
30    PRINT "DOWN AGAIN"
40    PRINT "THE END"
50    GOTO 80
60    PRINT "JUMP UP"
70    GOTO 30
80    END
```

2. Guess what will be printed out.

```
10    GOTO 100
20    PRINT "IS"
30    GOTO 80
40    PRINT "ALOHA STATE"
50    GOTO 110
60    PRINT "HAWAII"
70    GOTO 20
80    PRINT "THE"
90    GOTO 40
100   GOTO 60
110   END
```

3. Here's a neat one!

```
10    PRINT "ALOHA"
20    GOTO 50
30    PRINT "HELLO"
40    GOTO 70
50    PRINT "HOWZIT"
60    GOTO 30
70    PRINT "SAYONARA"
80    END
```

4. Here are three similar-looking programs, A, B, and C. Predict what the outcome will be and jot the answer down before you try these on the computer.

PREDICTED OUTCOME COMPUTER OUTPUT

A.
```
10  PRINT "ALOHA"
20  GOTO 10
30  END
```

B.
```
10  PRINT "ALOHA";
20  GOTO 10
30  END
```

C.
```
10  PRINT "ALOHA",
20  GOTO 10
30  END
```

SUMMARY OF A, B, AND C. FILL IN THE APPROPRIATE BLOCKS

| Item | What happens on the screen |
|---|---|
| A) No punctuation | Prints "ALOHA" in one column |
| B) Semi-colon | |
| C) Comma | |

5. Try writing a program which will fill the screen with your name.

# LOOPING AROUND
## (For-Next Loops)

FOR and NEXT statements tell exactly how many loops to make. Each time you see a FOR, there should be a NEXT in the program.

Make a prediction as to what the output of each program will be before you try it on the computer.

1. Program A

PROGRAM OUTCOME COMPUTER OUTPUT

```
10  PRINT "LOOP"
20  For J=1 to 3
30  PRINT "AROUND"
40  PRINT "AND AROUND"
50  NEXT J
```

2. Program B: The output. Write a program that gives you this output:

```
SWING
UP
AND DOWN
UP
AND DOWN
```

3. Change your program B to produce these results:

```
SWING
UP AND DOWN
UP AND DOWN
```

4. For-Next loops are helpful in controlling the number of times something is repeated. Here is an example.

| | CONTROL VARIABLE | | INITIAL VALUE | | ENDING VALUE | INCREMENT |
|---|---|---|---|---|---|---|
| 10 FOR | J | = | 1 | to | 10 | step 2 |

```
20  PRINT J
30  NEXT J
40  END
```

This will be the output:

```
1
3
5
7
9
```

5. Let's practice determining the values of K in each of the FOR statements:

| STATEMENT | CONTROL VARIABLES | VALUES OF K |
|---|---|---|
| FOR K = 4 to 9 | K | 4, 5, 6, 7, 8, 9 |
| FOR K = 1 to 25 STEP 5 | K | 1, 5, 10, 15, 20, 25 |
| FOR K = 5 to 0 STEP -1 | K | 5, 4, 3, 2, 1, 0 |
| FOR K = -2 to 2 | K | -2, -1, 0, 1, 2 |
| FOR K = -3 to 3 | | |
| FOR K = 0 to 20 STEP 2 | | |

6. In the following table, fill in the appropriate missing blanks.

| STATEMENT | CONTROL VARIABLES | VALUES OF THE VARIABLES |
|---|---|---|
| FOR M = 1 to 4 | M | |
| | X | 2, 4, 6, 8, 10, 12, 14, 16 |
| | T | 100, 90, 80, 70, 60, 50 |
| FOR A = 50 to 0 STEP -5 | A | |
| | L | 30, 40, 50, 60, 70, 80 |
| | B | -6, -5, -4, -3, -2, -1 |
| FOR P = 30 to 40 STEP 2 | | |
| FOR R = -3 to 3 | | |
| | | 4, 3, 2, 1, 0 |

7. Write a program which will have this output:

```
10
9
8
7
6
5
```

8. Write a program which will have this output:
```
0  1  2  3  4  5
```

9. Write a program which will have this output:
```
10  20  30  40  50
```

## READ/DATA STATEMENTS

To store information you may use a DATA statement. In a program you must have a READ statement to go with the DATA statement. The DATA statement can be at the beginning, middle or end of the program.

Predict the outcomes of each program and write them in the space provided. Then try the program on the computer and write the output in the appropriate space to the right.

PREDICTED OUTCOME COMPUTER OUTPUT

1. Program A

```
10  READ N
20  IF N = 5 THEN END
30  PRINT N
40  GOTO 10
50  DATA 0, 2, 4, 5
60  END
```

Note: The computer reads 0, 2, 4, and 5 but ends before it prints 5. 5 is called the "dummy" data.

2. Program B

This program reads two pieces of information (A and B) at one time.

```
10  READ A,B
20  IF A=10 THEN END
30  LET C=A+B
40  PRINT C
50  GOTO 10
60  PRINT B
70  GOTO 10
80  DATA 9, 10, 8, 14, 9,
    3, 10, 10
90  END
```

3. Program C

This program reads a pair of numbers, and prints out an equation showing their sum. It repeats the process three times. Figure out the answers.

```
10  DATA 9, 8, 10, 7, 11, 6
20  FOR X = 1 to 3
30  READ A, B
40  PRINT A; "+"; B; "="; A+B
50  NEXT X
```

186

180

4. Program D

PREDICTED OUTCOME COMPUTER OUTPUT

This program reads three numbers at one time and prints their sum. How many sums are printed?

```
10  FOR X = 1 to 4
20  READ A, B, C
30  PRINT A + B + C
40  NEXT X
50  DATA 5, 4, 3
60  DATA 10, 9, 8
70  DATA 100, 200, 300
```

5. Write a program whose outcome is:

1 + 2 + 3 = 6

INSTRUCTIONAL MATERIALS

## EXPLORATORY COMPUTER LITERACY SOFTWARE LIST

| Title | Grade(s) | Hardware | Use | Cost | Publisher |
|---|---|---|---|---|---|
| Arithmetic Skills | K-6 | APP | Drill & Practice | $ 49.00 | EWS |
| Astheometry Vol. 1 | 6-12 | APP | Graphics | $ 15.00 | MEC |
| Bank Street Writer, Speller | 4-12 | APP, IBM | Word Processing | $ 70.95 | SCH |
| Bumble Games | K-4 | APP | Problem Solv. Game | $ 39.95 | TLC |
| Classification | 4-9 | APP, IBM | Problem Solving | $ 36.00 | MEC |
| Cut & Paste | 4-12 | APP | Word Processing | $ 50.00 | ELA |
| Delta Drawing | K-12 | APP, IBM | Pre-Programming,Graphics | $ 59.95 | SSC |
| EZ Logo | K-3 | APP | Pre-Programming | $ 48.00 | MEC |
| Early Games Music | K-6 | APP, IBM | Tutorial, Practice | $ 29.95 | CSI |
| Easy Graph | 4-9 | APP | Graphing | $ 39.95 | GRO |
| Elem. Vol. 1 Math | 1-6 | APP | Drill, Games | $ 45.00 | MEC |
| Elem. Vol. 4 Math/Sci. | 2-6 | APP | Drill, Simulations | $ 49.00 | MEC |
| Elem. Vol 2, 3, 6 Social St. | 3-8 | APP | Simulations | $ 49.00 | MEC |
| Experiencing Procedures | 6-9 | APP, IBM | Pre-Programming | $ 36.00 | MEC |
| Facemaker | K-3 | APP, IBM | Pre-Programming, Games | $ 34.95 | SSC |
| Flight Simulator | 7-12 | IBM | Simulation | $ 34.50 | MCP |
| Friendly Filer | 4-9 | APP | Data Base | $ 39.95 | GRO |
| Gertrude's Puzzles | 3-9 | APP | Problem Solving, Game | $ 44.95 | TLC |
| Gertrude's Secrets | K-5 | APP | Problem Solving, Game | $ 44.95 | TLC |
| Homeword | 4-12 | APP | Word Processing | $ 69.95 | SOL |
| Juggles' Rainbow | K-1 | APP, IBM | Learning Game | $ 29.95 | TLC |
| Kidwriter | 1-5 | APP, IBM, C64 | Word Processing | $ 29.95 | SSC |
| King's Rule | 4-12 | APP, C64, TRS | Problem Solving | $ 35.00 | MEC |
| Know Your Apple | 2-12 | APP | Keyboard Familiarity | $ 39.95 | MSE |
| KoalaPad Touch Tablet | K-12 | APP, IBM | Graphics | $149.95 | KOA |
| Logo Programs | K-12 | IBM | Programming | $125.00 | IBM |
| Logo Programs | K-12 | APP | Programming | $80-$150 | APP |
| Loops | 6-9 | APP, IBM | BASIC Programming | $ 36.00 | MEC |
| MasterType | 2-12 | APP, IBM | Keyboarding | $ 39.95 | K12 |
| Memory: 1st Step in Prob Solv | K-6 | APP, IBM | Problem Solving | $210.00 | SUN |
| Microzine | 4-8 | APP | Disk Magazine | $149.00 | SCH |
| Modeling | 4-9 | APP, IBM | Problem Solving | $ 36.00 | MEC |
| Moptown Hotel | 3-12 | APP | Problem Solving | $ 39.95 | TLC |
| Moptown Parade | K-5 | APP | Logic Games | $ 39.95 | TLC |
| Newberry Winner Series | 3-7 | APP | Rdg Ext, Drill, Games | $25-$250 | SUN |

| Title | Grade(s) | Hardware | Use | Cost | Publisher |
|---|---|---|---|---|---|
| Oh, Deer! | 5-9 | APP | Simulation | $ 44.00 | MEC |
| PCcrayon | 7-12 | IBM | Graphics | $ 45.00 | PCS |
| PFS:FILE | 7-12 | APP, IBM, TRS | Data Manager | $140.00 | SPC |
| PFS:GRAPH | 7-12 | APP, IBM, TRS | Graph Generator | $125.00 | SPC |
| PFS:REPORT | 7-12 | APP, IBM, TRS | Report Generator | $125.00 | SPC |
| Problem Solving in Math | 3-6 | APP | Problem Solving | $215.00 | BER |
| Problem Solving Strategies | 4-9 | APP | Problem Solving | $ 48.00 | TLC |
| Processing Words | 6-9 | APP, IBM | Word Processing | $36.00 | MEC |
| Question | 3-12 | IBM | Game Shell | $45.00 | ASC |
| Robot Probe | 3-12 | TRS | Problem Solving | $49.00 | SUN |
| Rocky's Boots | 3-12 | APP | Logic | $ 49.95 | TLC |
| Snooper Troops Series | 4-12 | APP, IBM | Game | $ 44.95 | SSC |
| Sticky Bear ABC | K-1 | APP, IBM | Letter Recognition | $ 39.95 | XER |
| Story Machine | K-4 | APP, IBM | Keyboard Familiarity | $ 34.95 | SSC |
| Story Tree | 4-12 | APP, IBM | Language Arts | $ 59.95 | SCH |
| Survival Math | 6-12 | APP, IBM, TRS | Simulation | $ 49.00 | SUN |
| Superscripsit | 4-12 | TRS | Word Processing | $199.00 | RAD |
| Teasers by Tobbs | 4-12 | APP, IBM | Problem Solving, Games | $ 49.00 | SUN |
| The Factory | 3-12 | APP | Problem Solving | $ 49.00 | SUN |
| The Friendly Computer | K-3 | APP | Keyboard Familiarity | $ 48.00 | MEC |
| The Glass Computer | 6-9 | APP, IBM | BASIC Programming | $ 36.00 | MEC |
| The Incredible Laboratory | 3-12 | APP | Problem Solving | $ 49.00 | SUN |
| The Pond | 3-12 | APP, IBM | Problem Solving | $ 49.00 | SUN |
| The Print Shop | 4-12 | APP | Graphics | $ 49.95 | BRO |
| Thinking Skills | 2-7 | TRS | Problem Solving | $ 49.00 | SUN |
| WordProof | 4-12 | IBM | Word Processing | $ 60.00 | IBM |
| Word Spinner | 1-6 | APP, IBM, C64 | Word Game | $ 34.95 | TLC |

PUBLISHER CODES

| CODE | PUBLISHER | ADDRESS | CITY,STATE | ZIP |
|---|---|---|---|---|
| APP | APPLE COMPANY | 10260 BANDLEY DR. | CUPERTINO, CA | 95014 |
| ASC | ALPHA PORATION | 12 NEW ENGLAND EXEC PK | BURLINGTON, MA | 07803 |
| BER | BERTAMAX (EISI) | 3647 STONEWAY NORTH | SEATTLE, WA | 98103 |
| BRO | BRODERBUND SOFTWARE | 1938 FOURTH STREET | SAN RAFAEL, CA | 94901 |
| CSI | COUNTERPOINT SOFTWARE | 4005 W. 65TH ST. #218 | EDINA, MN | 55435 |
| ELA | ELECTRONIC ARTS | 2755 CAMPUS DR. | SAN MATEO, CA | 94403 |
| EWS | EDU-WARE SERVICES, INC. | 22035 BURBANK BLV. 223 | WOODLAND HILLS, CA | 91368 |
| GRO | GROLIER ELEC. PUBL. | 95 MADISON AVE. #407 | NEW YORK, NY | 10016 |
| IBM | IBM CORP. | P.O. BOX 1328 | BOCA RATON, FL | 33432 |
| LOA | KOALA TECHNOLOGY CORP. | 3100 PATRICK HENRY DR. | SANTA CLARA, CA | 95052 |
| K12 | K-12 MICROMEDIA | 172 BROADWAY | WOODCLIFF LAKE, NJ | 07675 |
| MCP | MICROSOFT CONSUMER PROD. | 10700 NORTHRUP WAY | BELLEVUE, WA | 98004 |
| MEC | MECC | 2520 BROADWAY DR. | ST. PAUL, MN | 55113 |
| MSE | MUSE SOFTWARE | 347 NO. CHARLES ST. | BALTIMORE, MD | 21201 |
| PCS | PC SOFTWARE | 4155 CLEVELAND AVE. | SAN DIEGO, CA | 92103 |
| RAD | RADIO SHACK | 1400 ONE TANDY CENTER | FORT WORTH, TX | 76102 |
| SCH | SCHOLASTIC, INC. | 904 SYLVAN AVE. | ENGLEWOOD CLFS, NJ | 07632 |
| SOL | SIERRA ON-LINE, INC. | SIERRA ON-LINE BLDG. | COARSEGOLD, CA | 93614 |
| SPC | SOFTWARE PUBLISH. CORP. | 1901 LANDINGS DR. | MOUNTAIN VIEW, CA | 94943 |
| SSC | SPINNAKER SOFTWARE | 215 FIRST STREET | CAMBRIDGE, MA | 02142 |
| SUN | SUNBURST COMMUNICATIONS | 39 WASHINGTON AVE. | PLEASANTVILLE, NJ | 14850 |
| TLC | THE LEARNING COMPANY | 4370 APLINE RD. | PORTOLA VALLEY, CA | 94025 |
| XER | XEROX EDUCATION PUBL. | 245 LONG HILL RD. | MIDDLETOWN, CT | 06457 |

## RECOMMENDED PERIODICALS

### Educational Periodicals

ACM SIGCUE Bulletin; Association for Computing Machinery; P.O. Box 12015, Church Street Station, NY 10249

AEDS Journal and AEDS Monitor; Association for Educational Data Systems; 1201 Sixteenth St., NW, Washington, DC 20036

Classroom Computer Learning; Classroom Computer News; 5615 West Carmel Road, Cicero, IL 60650

Educational Technology; 140 Sylvan avenue, Engelwood Cliffs, NJ 07632

Electronic Learning; Scholastic, Inc., 901 Sylvan Avenue, Englewood Cliffs, NJ 07632

Microcomputers in Education; QUEUE, 5 Chapel Hill Drive, Fairfield, CT 06432

Recreational Computing; P.O. Box E, 1263 El Camino Real, Menlo Park, CA 94025

The Computing Teacher; International Council for Computers in Education, Department Computer and Information Science, University of Oregon, Eugene, OR 97403

Teaching and Computers; P.O. Box 644, Lyndhurst, NJ 07071

### Periodicals

A+ (Apple); Ziff Davis Publishing, One Park Avenue, New York, NY 10016

BYTE; 70 Main Street, Peterborough, NH 03458

Compute!; Small systems Services, Inc., Greensboro, NC 27403

Creative Computing; Elizabeth Styles, ed., P.O. Box 789-M, Morristown, NJ 07960

80-Micro; 80 Pine Street, Peterborough, NH 03458.

Family Computing; Scholastic, Inc., 730 Broadway, New York, NY 10003

InfoWorld; 530 Lytton Avenue, Palo Alto, CA 94301

Nibble (Apple); P.O. Box 325, Lincoln, MA 01773

PC World (IBM); Subscription Department, P.O. Box 6700, Bergenfield, NJ 07621

Personal Computing; P.O. Box 1408, Riverton, NJ 08077

Popular Computing; Byte Publications, Inc., P.O. Box 307, Martinsville, NJ 08836

SoftSide; P.O. Box 68, Milford, NH 03055

Softtalk (for IBM, Apple); 7250 Laurel Canyon Blvd., North Hollywood, CA 91605

Source World; Source Telecomputing Corporation, 1516 Anderson Road, McLean, VA 22102

COMPUTER BOOKS FOR STUDENTS

Computer Basics. Hal Hellman. Prentice-Hall. 1983.

Computers. Linda O'Brien. Watts. 1978.

Computers for Kids; Apple II plus. Sally Larsen. Creative Computing Press. 1981

Computers for Kids; Atari Edition. Sally Larsen. Creative Computing Press.

Computers for Kids; TRS-80 Edition. Sally Larsen. Creative Computing Press. 1980.

Computers for Kids; Vic-20 Edition. Sally Larsen. Creative Computing Press. 1983.

Computers in Our World, Today and Tomorrow. Sandy & Martin Hintz. Watts. 1983.

Creative Kid's Guide to Home Computers. Fred D'Ignazio. Doubleday. 1981.

Data Processing. Melvin Berger. Watts. 1983.

Electronic Games. Fred D'Ignazio. Watts. 1982.

Illustrated Computer Science Dictionary for Young People. Donald D. Spencer. Camelot. 1982.

Invent Your Own Computer Games. Fred D'Ignazio. Watts. 1983.

Kids and the Apple. Datamost. Reston. 1982.

Kids and the Atari. Prentice-Hall. 1983.

Kids and the Vic. Prentice-Hall. 1983.

Messner's Introduction to the Computer. Fred D'Ignazio. Messner. 1983.

Programming in BASIC. Christopher Lampton. Watts. 1983.

Programming the IBM Personal Computer: BASIC. Neill Graham. Holt. 1983.

Programming the IBM Personal Computer: Fortran 77. Robert A. Rouse. Holt. 1983.

Programming the IBM Personal Computer: ULSD Pascal. Seymour Pollack. Holt. 1983.

Robotics: Past, Present, and FUture. David C. Knight. Morrow. 1983.

Scholastic Computing. Jack L. Roberts. Scholastic Inc. 1984.

Small Computers: Exploring Their Thechnology and Future. Fred D'Ignazio. Watts. 1981.

Star Wars Q & A About Computers. Fred D'Ignazio. Random House. 1983.

Using the Computer. Neil Ardley. Watts. 1983.

Working Robots. Fred D'Ignazio. Elsevier/Nelson. 1982.

Your Career in Computer-Related Occupations. William Koller.

Your IBM Personal Computer: Use, Applications, and BASIC. David E. Cortesi. Holt. 1983.

TEACHER REFERENCES

Professional Reading

Computer Consciousness: Surviving the Automated 80's. Domini H. Covvey. Addison-Wesley. 1980.

Computer Literacy: Issues and Directions for 1985. Robert Seidel, Ronald Anderson, and Beverly Hunter. Academic Press. 1982.

Computers in the Classroom. Henry S. Kepner, Jr., ed. Goodson. Addison-Wesley. 1982.

Computers, Teaching and Learning. Jerry W. Willis et al. Dilithium Press. 1983.

Computers Today. Donald H. Sanders. McGraw-Hill. 1983.

Courseware in the Classroom. Ann Lathrop and Bobby Goodson. Addison Wesley. 1983.

Microcomputers: A Parent's Guide. Kenneth P. Goldberg and Robert D. Sherwood. John Wiley & Sons, Inc. 1983.

Mindstorms: Children, Computers and Powerful Ideas. Seymour Papert. Basic Books. 1980.

My Students Use Computers. Beverly Hunter. Reston. 1983.

Practical Guide to Computers in Education. Peter Coburn et al. Addison-Wesley. 1982.

School Administrator's Introduction to Instructional Use of Computers. David Moursund. International Council for Computers in Education. 1980.

Teacher's Guide to Computers in the Elementary School. David Moursund. International Council for Computers in Education. 1980.

The Mind Tool: Computers and their Impact on Society, 2nd edition. Neill Graham. West Publishing Company. 1980.

Using A Microcomputer in the Classroom. Gary G. Bitter and Ruth A. Camuse. Reston. 1984.

Programming Languages

BASIC Discoveries. Linda Malone and Jerry Johnson. Creative Publications. 1981.

Computer Literacy: A Hands-On Approach. Arthur Luehrmann and Herbert Peckham. McGraw-Hill. 1983.

Kids and the (Apple, IBM, or Commodore). Edward H. Carlson. Datamost. 1982.

Learning with Logo. Dave Watt. BYTE/McGraw-Hill. 1982.

Logo Cards: Activities for Logo. Scott Foresman & Company. 1983.

Logo Discoveries. Margaret L. Moore. Creative Publications. 1984.

Logo Reference Flip Chart. Scott Foresman & Company. 1983.

Spotlight on Computer Literacy. Ellen Richman. Random House. 1982.

Teaching BASIC Bit by Bit. Batya Friedman and Twila Slesnick. MCEP, Lawrence Hall of Science, University of California, Berkley, CA. 1980.

The Turtle's Sourcebook. Donna Bearden et al. Reston. 1983.

RESOURCES ON COMPUTER EDUCATION AVAILABLE AT THE TECHNICAL ASSISTANCE CENTER

Filmstrips

001.64
A
APPLE COMPUTER BASIC
Prentice Hall, 1984
4 fs, 4 cassettes, guide; Grades 7-12
Designed to familiarize prospective users of the Apple personal computer with the Apple keyboard and other essential hardware, to introduce them to writing simple programs in Basic, and to demonstrate the use of diskettes and cassette tapes as storage media.

658.054
C
CAREERS IN COMPUTER SCIENCE AND SERVICE
Center for Humanities, 1982
4 fs, 4 cassettes, guide; Grades 7-12
Identifies the main categories of computer-related careers and describes specific jobs and opportunities for advancement in each area.

001.64
C
COMPUTER AWARENESS
SVE, 1981
4 fs, 4 cassettes, guide; Grades 4-6
Explains the design and use of computers. Clear, simple information acquaints the novice with computers and how they work.

001.64
C
COMPUTER BASICS
Adrian Vance, 1981
6 fs, 6 cassettes, guide; Grades 7-12
Designed to be used by anyone new to computers and computing. The program presents clear, easy-to-understand information about computers.

001.6
C
COMPUTER LITERACY: THE FIRST STEP
Educational Dimensions, 1981
4 fs, 4 cassettes, guide; Grades 6-12
Students are introduced to basic computer concepts and are exposed to the wide variety of computers and computer skills that are part of the computer revolution.

001.642
C
COMPUTER PROGRAMMING: INTRODUCTION TO PROGRAMMING
Prentice Hall, 1982
5 fs, 5 cassettes, guide; Grades 9-12
The basic ideas, the logical reasoning, and the major programming techniques involved in the process of writing a program are examined in detail, but without recourse to any particular programming language. Thus the groundwork is laid for successful program writing in any of several languages.

Filmstrips - Continued

001.64
C
COMPUTER HARDWARE: WHAT IT IS AND HOW IT WORKS
Center for Humanities, 1982
4 fs, 4 cassettes, guide; Grades 7-12
Identifies the physical components of a computer system and describes the functions of each. Explains how computer hardware is designed to receive information, process it, and transmit the results.

001.642 5
C
COMPUTER SOFTWARE: WHAT IT IS AND HOW IT WORKS
Center for Humanities, 1982
4 fs, 4 cassettes, guide; Grades 7-12
This program examines the different levels of computer language and differentiates three types of software. It also describes, with examples in Basic, the function of program instructions in unleashing the power of a computer.

001.64
C
COMPUTERS IN OUR SOCIETY
Encyclopaedia Britannica, 1982
5 fs, 5 cassettes, guide; Grades 7-12
Introduces students to the wide variety of computers and shows examples of the roles of computers in our society. Emphasis throughout the series is on impact, effect, influence, and relevance of the limitless number of ways that computers touch our daily lives.

001.6
C
COMPUTERS: WHAT THEY ARE ALL ABOUT
January Productions, 1983
5 fs, 5 cassettes, guide; Grades 6-12
This series acquaints students with the operation and use of computers; gives them an understanding of computer terminology and introduces skills leading to computer literacy. Emphasis is placed upon the microcomputer and the Basic language.

001.64
G
GETTING TO KNOW THE MICROS
Prentice Hall, 1983
5 fs, 5 cassettes, guide; Grades 7-12
Introduces the five major computers and illustrates the various business, educational, and home applications for each.

001.64
I
INTRODUCTION TO DATA PROCESSING
Educational AV, 1981
4 fs, 4 cassettes, guide; Grades 6-9
Provide a simple, clear introduction to computers, what they can do and how they do it.

001.64
T
TRS-80 BASIC
Prentice Hall, 1984
4 fs, 4 cassettes, guide; Grades 7-12
Introduces students to the TRS-80's keyboard and to writing simple programs in Basic. Demonstrates the use of diskettes and cassette tapes as storage media.

16mm Films

7705 AND WHAT OF THE FUTURE?
Films Incorporated, 1981
40 min.; J-H
Will the recent developments in electronic microcircuitry result in a better or worse life for the average person? Will people lose jobs once thought secure? Will the technology be used to replace people on monotonous or dangerous jobs? Visits to the Washington D.C. Metro (subway), a Dallas supermarket, and a Scottish hospital illustrate the benefits and problems.

7724 THE COMPUTER AND YOU - AN INTRODUCTION
Handel Film Corporation, 1983
16 min.; E-J
A primer for computer operations designed for audiences who have no prior knowledge in this field. The computer terms come to life by watching a student developing a program about the states in the USA and the provinces of Canada.

6702 COMPUTER COLOR GENERATIONS
United States Department of Energy, 1972
23 min.; J-H C
Discusses new techniques in computer technology which virtually eliminate the extra cost of color in computer displays. Includes research on thermonuclear problems, lasers, engineering and three dimensional problems.

6703 COMPUTER FLUID DYNAMICS
United States Department of Energy, 1969
24 min.; J-H C
Demonstrates the power of today's giant electronic computers for solving problems that previously were impractical to undertake. Presents a wide range of fluid flow problems, shows several examples of fluid flow calculations, and describes how computer calculations are accomplished.

7682 COMPUTERS AND THE FUTURE
Time-Life Media, 1982
30 min.; J-H
Combining documentary techniques with vignettes, the film explores our growing relationship with communications technologies such as interactive computers, cable television and video discs. The program explores the effect of this new media form on the way we live, work and play. Futurologist Peter Schwartz is host.

6318 COMPUTERS AND YOU
Journal Films, Incorporated, 1972
15 min.; E-J
Introduces computers--what they are, their operational functions, and what they can do. Shows general purpose computers and special purpose computers. Examines the advantages of computers and points out how they can best serve various needs.

7798 COMPUTERS: THE FRIENDLY INVASION
Walt Disney Educational Media Company, 1982
20 min.; E-H
Computer graphics and scenes from the Disney feature "Tron" illustrate some computer applications in an entertaining film that introduces students to a future resource. They are introduced to how computers work, the many tasks they can perform, and the opportunities they offer in science and the arts.

7668 COMPUTERS: TOOLS FOR PEOPLE
Churchill Films, 1983
22 min.; E-H T
Shows how computers are used in many ways: for file management; control of other machines; support of creative work; and for mathematical tasks including modeling. Demonstrates how applications are developed through research, flowcharting, programming and debugging. Emphasizes the human responsibility for computer performance and the excitement of people creating their own tools.

7473 THE MIND MACHINES, PARTS I & II
Time-Life Media, 1979
57 min.; H C
The controversy surrounding artificial intelligence is examined. Computer fundamentals are explained and compared to human intelligence. Limitations of computers to memory and calculations functions are used to argue the nature of human intelligence which includes judgement, common sense, etc.

7707 NOW THE CHIPS ARE DOWN, PARTS I & II
Films Incorporated, 1981
50 min.; J-H C A T
Microprocessors smaller than a postage stamp have the power of room-sized computers of a generation ago. We hear a machine that can read aloud, see a driverless tractor and a warehouse that needs no staff among the samples of the wonders created by cheap computer power. We also learn how micro-computers are made, and hear predictions of future changes.

6858 TIC - INDEX TO ENERGY
United States Department of Energy, 1977
6 min.; H C A
Describes the Technical Informatin Center (TIC) of the Department of Energy at Oak Ridge, Tennessee. The computerized facility gathers, abstracts and catalogues technical reports and published scientific papers from sources around the world. This material is evaluated and part of it becomes a permanent part of the data bank of technical and scientific energy information.

Videotapes

0890-1 COMPUTER COLOR GENERATIONS
ERDA, 1972
23 mins., Color; J-H C
Discusses new techniques in computer technology which virtually eliminate the extra cost of color in computer displays. Includes research on thermonuclear problems, laser, engineering and three dimensional problems.

0911-1 COMPUTER FLUID DYNAMICS
ERDA, 1969
24 mins., Color; J-H C
Demonstrates the power of today's giant electronic computers for solving problems that previously were impractical to undertake. Presents a wide range of fluid flow calculations and describes how computer calculations are accomplished.

0815-2 COMPUTER FRIEND
WPBT Public Television, 1976
30 mins., Color (Que Pasa, USA?); H A
Carmen fills out an application for a computer program that matches up people of similar interests and family backgrounds. Spanish/English program.

1282-1 COMPUTERS
Hawai'i Public Television, 1980
60 mins., Color (Dialog); H C A
Presents a group of computer experts who discusses the use of computers, their advantages and possible disadvantages. The question is--what is the future of computers, will they compete with people forjobs? NOT FOR CATV USE.

1278-4 COMPUTERS (SHORT VERSION)
Hawai'i Public Television, 1980
10 mins., Color (Dialog); H C A
Edited version of "Computers" without the panel discussion. Shows only the mini-documentary of the topic up for discussion.

R129-1 COMPUTERS AND THE FUTURE
Time Life Video, 1982
30 mins., Color; J-H A
Combining documentary techniques with vignettes, the film explores our growing relationship with communications technologies such as interactive computers, cable television and video discs. The program explores the effect of these new media forms on the way we live, work and play. Futurologist Peter Schwartz is host. LOAN ONLY. NOT FOR CATV USE. NOT AVAILABLE TO PUBLIC LIBRARIES.

1664-2 DATA PROCESSING
Kapi'olani Community College, 1983
12 mins., Color (A Career in Focus); J-H
In the business world, computers play a major role in data processing, accounting, and record keeping. This program describes the duties and work of computer operators, computer programmers, data entry clerks and control clerks. KCC offers a two-year course in computer education.

Videotapes

R199-1 BEYOND THE PROGRAM
Great Plains National, 1980
20 mins., Color (Business Computing...Cut Down to Size); A
Outlines elements of data reliability and accuracy and stresses the need for safeguards. LOAN ONLY. NOT FOR CATV USE. NOT AVAILABLE TO PUBLIC LIBRARIES.

R197-1 COMMUNICATING WITH YOUR COMPUTER
Great Plains National, 1980
27 mins., Color (Business Computing...Cut Down to Size); A
Introduces and compares elements of programming languages. LOAN ONLY. NOT FOR CATV USE. NOT AVAILABLE TO PUBLIC LIBRARIES.

R196-1 FITTING OUT
Great Plains National, 1980
15 mins., Color (Business Computing...Cut Down to Size); A
Offers guidelines on determining the capabilities of computer systems (size, storage, maintenance). LOAN ONLY. NOT FOR CATV USE. NOT AVAILABLE TO PUBLIC LIBRARIES.

R195-1 MEASURING UP
Great Plains National, 1980
15 mins., Color (Business Computing...Cut Down to Size); A
Details applications and types of small computers and their integration into a business. LOAN ONLY. NOT FOR CATV USE. NOT AVAILABLE TO PUBLIC LIBRARIES.

R198-1 UNDERSTANDING SOFTWARE
Great Plains National, 1980
16 mins., Color (Business Computing...Cut Down to Size); A
Discusses types, applications and the choosing of software. LOAN ONLY. NOT FOR CATV USE. NOT AVAILABLE TO PUBLIC LIBRARIES.

## COMPUTER KEYBOARDS AND CHARTS

| | |
|---|---|
| Apple IIe Keyboard | 37" x 11" |
| Apple IIe Keyboard | 8½" x 13" |
| Atari Keyboard | 33" x 10" |
| Atari Keyboard | 8½" x 11" |
| Commodore 64 Keyboard | 31" x 13" |
| Commodore 64 Keyboard | 18" x 14" |
| IBM-PC Keyboard | 10" x 38" |
| IBM-PC Keyboard | 8½" x 11" |
| Radio Shack TRS-80 Model 4 Keyboard (with key pad) | 38" x 12" |
| TRS-80 Color Computer 1 & 2 Keyboard (without key pad) | 14" x 18" |
| IBM Selectric Typewriter Keyboard | 29½" x 11" |
| Special Keys: Apple IIe Chart | 23½" x 14" |
| Special Keys: IBM-PC Chart | 14" x 23½" |
| Computer Finger Chart | 8½" x 13" |
| Care and Handling of Diskette Chart | 18" x 12" |
| Computer Etiquette Chart | 18" x 12" |
| Computer System Components and Functions Chart | 18" x 12" |